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Arthur D Little

Performance of Sampling Activities at MTL, Watertown, Massachusetts for EG&G Idaho, Inc.

Final Report
Prepared for
U.S. Army Toxic and
Hazardous Materials Agency
and EG&G Idaho, Inc.

May 1990

Arthur D. Little, Inc.
Acorn Park
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U.S. Army Toxic and Hazardous Materials Agency
CETHA-BC/Bldg. E4435
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Abstract

Arthur D. Little, Inc., was retained by EG&G Idaho, Inc., under subcontract C87-131488 issued pursuant to Contract No. DE-AC07-761D01570 to conduct geotechnical services at the Material Technology Laboratory (MTL) in Watertown, Massachusetts. The objective of this "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling is intended to duplicate, to the extent possible, the sampling performed in 1988.

The Army Materials Technology Laboratory (MTL) is located in Watertown, Massachusetts about six miles west of Boston. The facility currently occupies approximately 47 acres on the north bank of the Charles River and includes ten major structures used for research, development, testing and manufacturing.

The efforts involved in this investigation included:

- Collection of 18 groundwater samples at 16 existing monitoring wells. Two wells were sampled twice with the second sampling performed on a different day. Two field blanks were submitted with these samples. Trip blanks for volatiles were submitted with shipment of all volatile samples;
- Determination of water levels at 16 existing monitoring wells;
- Collection of 22 shallow surface soil samples taken by hand auger. This included two duplicate samples and two field blanks;
- Collection of three sediment samples from storm sewer catch basins;
- Collection of seven 24 hour composite samples from storm sewer outfalls on the Charles River;
- Collection of eight surface water and storage tank samples; and
- Collection of a sample of water from the reactor emergency coolant tank.

Samples were collected for volatile organics, base/neutral/acid extractables (semivolatile organics), pesticide/PCB's, metals, cyanide, and sulfide. The five samples collected adjacent to transformers were analyzed for PCBs only. Analyses necessary to chemically characterize samples in accordance with U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) certified methods were not completed under this contract but are provided under the USATHAMA Class contract with Arthur D. Little. Analytical data will be provided along with modeling, assessments, evaluations and conclusions in the Remedial Investigation (RI) Report.

The duration of the program was approximately nine weeks. Field activities commenced on February 5, 1990. All of the above tasks were successfully accomplished.

1.0 Introduction

Arthur D. Little, Inc., was retained by EG&G Idaho, Inc., under subcontract C87-131488 issued pursuant to Contract No. DE-AC07-761D01570 to conduct geotechnical services at the Material Technology Laboratory (MTL) in Watertown, Massachusetts. The objective of this "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling is intended to duplicate, to the extent possible, the sampling performed in 1988.

Analyses necessary to chemically characterize samples in accordance with U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) certified methods were not completed under this contract but are provided under the USATHAMA Class contract with Arthur D. Little.

1.1 Scope of Work

The efforts involved in this investigation included:

- Collection of 18 groundwater samples at 16 existing monitoring wells. Two wells were sampled twice with the second sampling performed on a different day. Two field blanks were submitted with these samples. Trip blanks for volatiles were submitted with shipment of all volatile samples;
- Determination of water levels at 16 existing monitoring wells;
- Collection of 22 shallow surface soil samples taken by hand auger. This included two duplicate samples and two field blanks;
- Collection of three sediment samples from storm sewer catch basins;
- Collection of seven 24 hour composite samples from storm sewer outfalls o the Charles River.
- Collection of eight surface water and storage tank samples; and
- Collection of a sample of water from the reactor emergency coolant tank.

All samples were collected in accordance with the USATHAMA QA Program, December 1986, 2nd Edition, March 1987, and Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition and Reports, March 1987. All samples were preserved as specified in that plan. Prior to transport all samples were screened for radioactivity. All samples were transported to the Arthur D. Little analytical laboratory and full chain of custody was maintained for all samples.

Samples were collected for volatile organics, base/neutral/acid extractables (semivolatile organics), pesticides/PCB's, metals, cyanide, and sulfide. The five samples collected adjacent to transformers were analyzed for PCBs only.

Chemical analysis necessary to develop data was conducted under a separate contract (under USATHAMA Class contract with Arthur D. Little) and thus will not be discussed in this final report. The list of compounds analyzed was specified by EG&G Idaho based on the previous sampling performed in 1988. Analytical data will be provided along with modeling, assessments, evaluations, and conclusions in the Remedial Investigation (RI) Report.

A review of options for disposal of purge waters was prepared. Purge water was contained in 55 gallon drums and stored on wooden pallets. Drums are labeled by the designation RI - MW - well number.

The duration of the program was approximately nine weeks. Field activities commenced on February 5, 1990. All of the above tasks were successfully accomplished.

Prior to commencing work at MTL, Arthur D. Little prepared a Health and Safety Plan, a Quality Control Plan, and a Sampling Plan. These plans, approved by EG&G Idaho and USATHAMA, detailed our procedures for site safety, operating procedures and quality objectives for site activities, locations of all samples and sampling procedures. During the program, quality objectives and performance were audited by Arthur D. Little's Quality Control Manager and during activity on site, safety procedures were monitored by Arthur D. Little's site Health and Safety Manager.

2.0 Site Location and History

2.1 Site Location

The Army Materials Technology Laboratory (MTL) is located in Watertown, Massachusetts about six miles west of Boston (see Figure 2.1). The facility currently occupies approximately 47 acres on the north bank of the Charles River and includes ten major structures used for research, development, testing and manufacturing.

2.2 Site History and Description

The MTL was originally established as the Watertown Arsenal in 1816 by order of President James Madison. The arsenal was initially used for the storage, cleaning, repair, and issue of small arms and ordinance supplies. Manufacturing was conducted on a limited scale until 1830. Activities were then expanded to include the manufacture of field, siege and seacoast guns, and gun carriages. During the Civil War, the arsenal was mobilized for the war effort and produced vast quantities of ammunition. In the 1880s the arsenal assumed responsibility for material testing and experimentation; special operations included mixing paint, preparing lubricants, waterproofing paper cartridges, and preparing ingredients for pyrotechnics such as post fires, fuzes, rock-fire, torches, fireballs, and signal rockets. In the final two decades of the 19th century, the arsenal was engaged in the manufacture of newly designed, field and siege, breech-loading steel guns and their carriages.

Activity at the arsenal increased dramatically during World War I. The facility was used for the production of ordinance supplies. More than 20 buildings were constructed during this period, and employment soared to more than 5,000. At its peak activity during World War II, the arsenal encompassed an area of approximately 131 acres, employed 10,000 people and maintained 53 buildings and structures. The number of employees dropped sharply after World War II. However, the arsenal continued to play an important role in arms development, and in 1953 it produced the famous 75-mm Skysweeper anti-aircraft gun. In 1960, the Army's first neutron radiography research nuclear reactor was dedicated at the facility. The reactor, used for researching the molecular and atomic structures of materials, was later deactivated in 1970.

A phase-down in operation was initiated in 1967. Much of the arsenal property was transferred to the General Services Administration (GSA). In 1968, approximately 55 acres of GSA property was sold to the Town of Watertown and was subsequently used for apartment buildings, the Arsenal Mall, and a public park and playground. Some 47.5 acres on the west end of the arsenal grounds was retained by the Army and later became the Army Materials and Mechanics Research Center (AMMRC), which in 1985 became MTL.

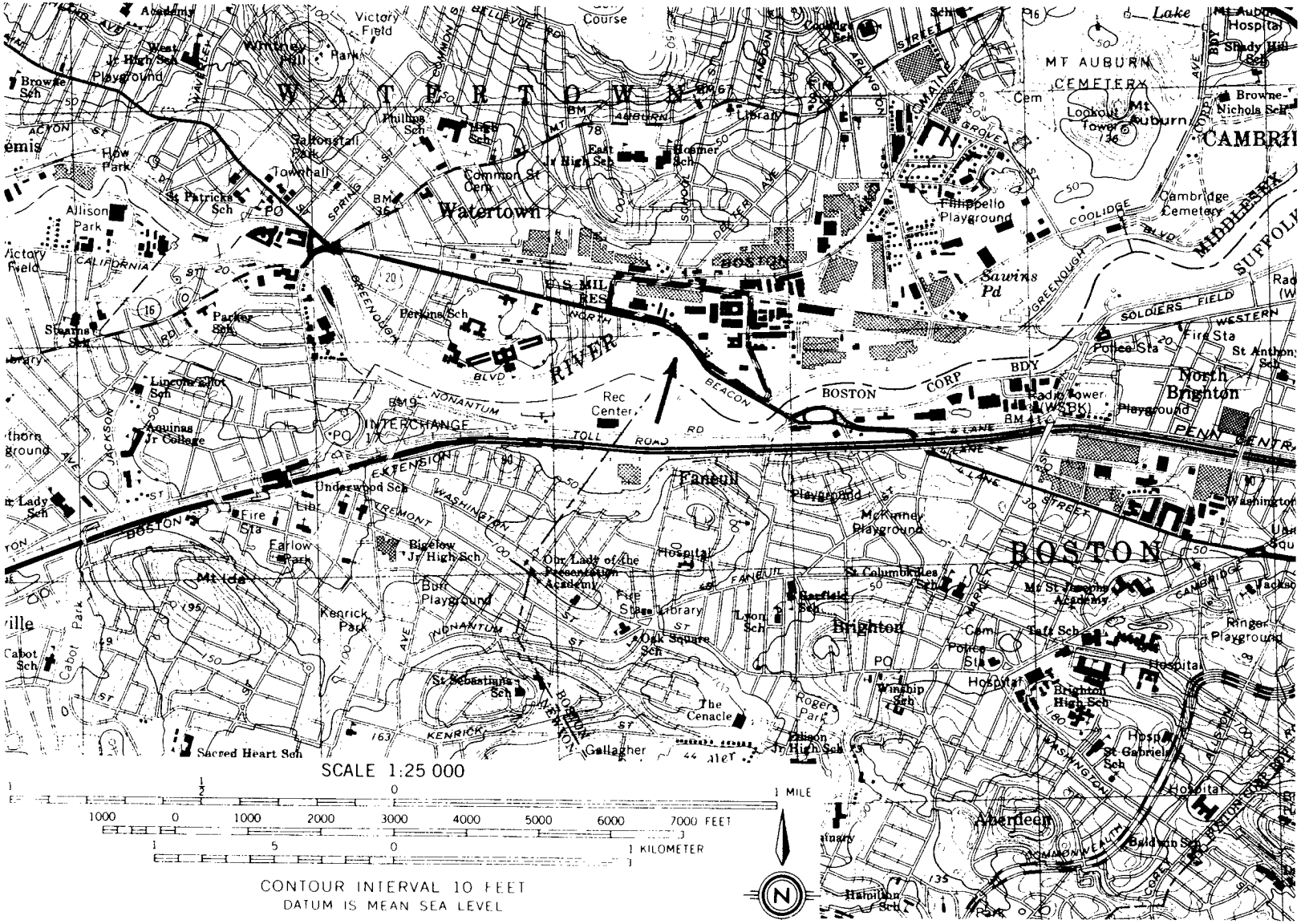


Figure 2.1 Location of Army Materials Technology Laboratory, Watertown, Massachusetts

While known as the AMMRC, the facility was designated a historical landmark by the American Society of Metals. Building 111 is virtually unaltered after 120 years of occupancy. It was placed on the National Register of Historic Places on January 30, 1976. In addition, a National Register nomination was prepared for the Gun Carriage Manufacturing Complex (Building 37, 43, 312, and 313).

Today, MTL employs approximately 600 people and occupies 15 buildings. It continues to function as the Army lead laboratory for materials, materials testing technology, lightweight armor, solid mechanics, and manufacturing testing technology.

3.0 Regional Geology

The following description of regional geology is taken from the 1988 Arthur D. Little report, "Geotechnical Report, Army Materials Technology Laboratory, Watertown, Massachusetts".

3.1 Bedrock Geology

The MTL facility is located within the north central portion of the Boston Basin, a topographic and structural basin bounded on the north and northwest by the North Boundary Thrust Fault, on the west by normal faulting and to the south by the Blue Hills and Ponkapoag Thrust Faults (Figure 3.1). To the southwest, intricate thrusting and tight, east plunging folds complicate the margin. The eastern margin of the basin is beneath Massachusetts Bay (Billings, 1976). Topographically the basin is bounded by low hills to the north, west, and south.

The basin is a structurally bounded depression in Precambrian basement filled with younger Mississippian and Pennsylvanian rocks (LaForge, 1932, Billings, 1976; and Kaye, 1980). At the southwest margin of the basin, the Precambrian basement outcrops in the cores of northeast plunging anticlines. To the south, between the Ponkapoag and Blue HIlls Thrust Faults, the basin is intruded by the peralkaline Blue Hills Complex of Cambrian-Devonian age. The Blue Hills complex includes the Quincy Granite and other felsic intrusions. In the southwest portion of the basin, altered felsic and basaltic volcanics of the Mississippian Mattapan Complex are exposed. Volcanics of similar composition assigned to the Mississippian Lynn Complex are crosscut the Precambrian basement and are included as casts in the Pennsylvanian Boston Bay Group (LaForge, 1932).

The Boston Bay Group consists of two formations, the lower Roxbury Conglomerate and the upper Cambridge Argillite. LaForge (1932) subdivided the Roxbury Conglomerate into three members, the Squantum, Dorchester, and Brookline Members. In general, the Roxbury Conglomerate outcrops south of the Charles River over the southern portion of the basin, and the Cambridge Argillite outcrops north of the Charles River.

The Cambridge Argillite is typically a varved or rhythmically layered, indurated siltstone. Beds range in thickness from 0.1 to 8 cm, and vary from dark gray, clay to silt-rich layers, to light gray, very fine to fine-grained sand layers. Graded beds, cross beds, ripple marks, and slump structures are observed.

3.2 Structural Geology

The internal structure of the Boston Basin consists of a series of broad folds, plunging gently to the northeast or east (Billings, 1976). The MTL facility is located on the axis of the Charles River Syncline (Figure 3.1). Most of the fault

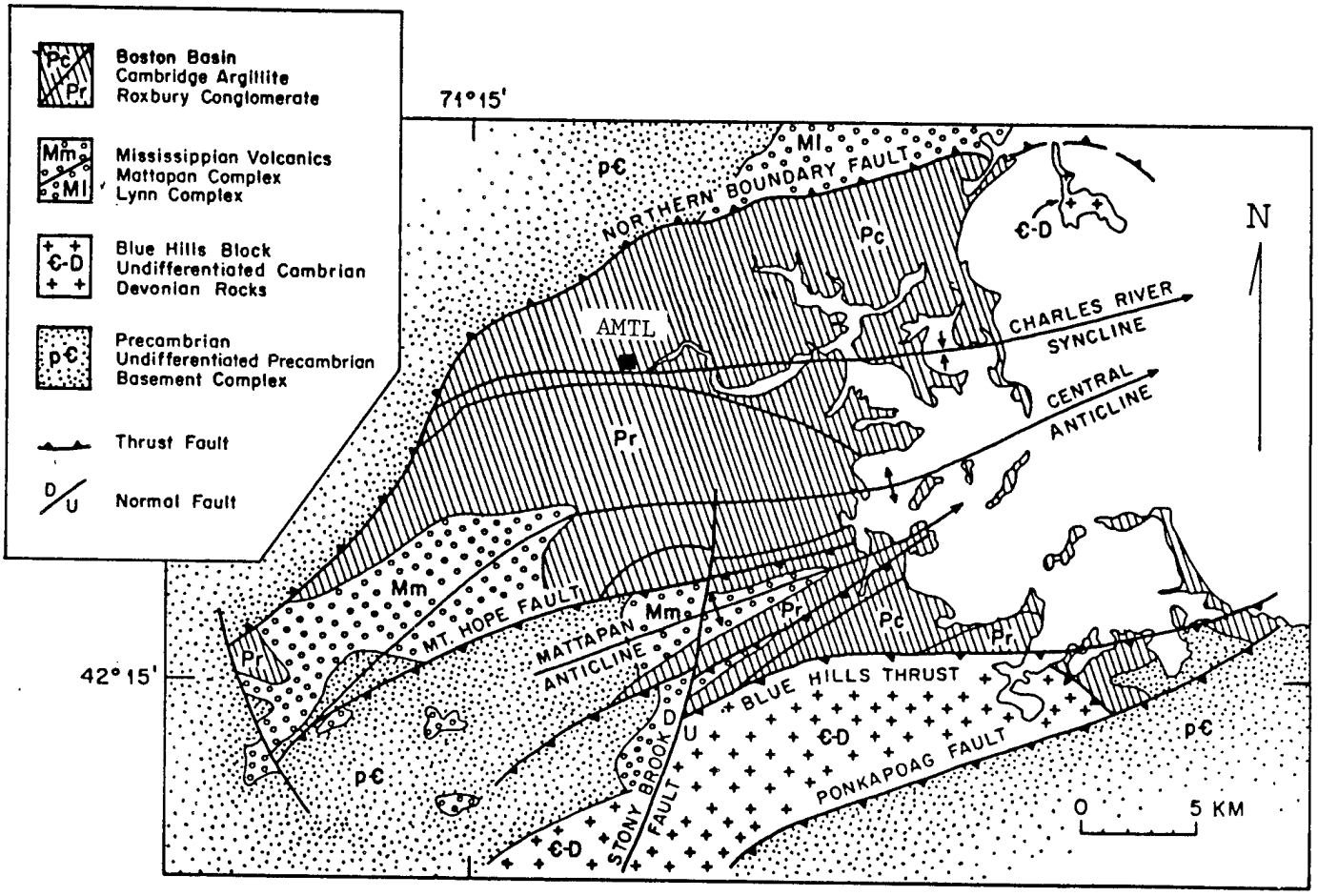


Figure 3.1 General geology of the Boston Basin (after Billings, 1976)

zones in the basin, including the bounding thrust faults, trend east-northeast. The only major exceptions to this area the Stony Brook Fault and an unnamed fault at the southwest margin of the basin, which are both normal faults and trend north-northeast and north-northwest, respectively. The Stony Brook Fault is mapped from Fresh Pond, approximately two miles east of the MTL, south-southwest for approximately 20 miles.

3.3 Quaternary Geology

Numerous glacial advances and retreats in the vicinity of the Boston Basin from 2 million years to 12,000 years ago have left a complex stratigraphic sequence of till, clay, and gravel. In general, the Quaternary aged deposits in the Boston Basin consist of (in ascending order) a basal till overlaying the bedrock, 0 to 70 feet thick, a marine clay, 0 to 60 feet thick, and outwash deposits of sand and gravel, 0 to 50 feet thick. General properties of the basal till and outwash deposits for the Boston area are summarized in Table 3.1.

Table 3.1 General Properties of Basal Till and Outwash Deposits in the Boston Area (After Hatheway, 1982)

Characteristic	Lodgement (Basal) Till	Outwash
Particle Size Gradation	Well graded; very heterogeneous	Gap-graded/poorly sorted semi-homogeneous
Presence of Boulders	Many, including erratics	Few to none
Percent (-) 200 Sieve	20-60	0-10
Percent (-) 0.02 mm	5-30	0-5
Effect of Fines	Governs engineering properties	Nil
Relative Density	Stiff - hard	Loose - moderately compact
Particle Shape	Angular-subangular	Subangular-rounded
Liquid Limit (%)	15-30	Non-plastic
Plasticity Index	0-20	Non-plastic
Standard Penetration (blows)	20-200+	0-20+
Cohesion (KN/m^2)	0-25	approx. 0
Friction Angle (°)	15-33	25-45
Consolidation Ratio	Overconsolidated	Normal to underconsolidated
Permeability (in situ) (cm/sec)	10^{-5} to 10^{-9}	10^{-2} to 10^{-5}

4.0 Site Geology

The following description of site geology is taken from the 1988 Arthur D. Little report, "Geotechnical Report, Army Materials Technology Laboratory, Watertown, Massachusetts", unless otherwise referenced.

4.1 Site Location

The Materials Technology Laboratory is located on the north bank of the Charles River in a generally flat area, decreasing in elevation (National Geodetic Vertical Datum, 1929) from approximately 36 feet at the north to approximately 2.4 feet (river elevation) at the south (Figure 4.1). Almost the entire MTL facility is situated on a low bluff, approximately 20 feet above the river elevation.

There are no known streams or natural drainages emptying to the Charles River in the vicinity of the MTL. All surface run-off is collected in the storm drain network and discharged to the river.

The locations of bore holes and monitoring wells placed at MTL during the 1988 geotechnical investigation by Arthur D. Little are shown in Figure 4.2. Two geologic cross sections, oriented approximately northwest-southeast are presented in Figure 4.3 and 4.4.

4.2 Bedrock Geology

The MTL facility is underlain by siltstone of the Pennsylvanian Cambridge Argillite. The siltstone was encountered at a depth of 61.5 feet in hole C01, at the northwest corner of the facility. At this location, the siltstone was very finely laminated with dark bluish gray silt to clay beds, and light bluish gray, very fine to fine-grained, sandy graded beds.

Observation of joints in a nearby outcrop, approximately 1 1/4 miles southwest of the facility, indicates three broad orientations:

- Parallel to bedding, oriented approximately east-west, dipping about 20-30° south;
- A dominant set, oriented north-northeast, dipping nearly vertical; and
- Parallel to sheer zones, oriented east-northeast.

The north-northeast joint orientation is also that generally followed by felsic dikes in the Boston Basin (striking N15-45°E, dipping 60-90°) and the Stony Brook Fault.

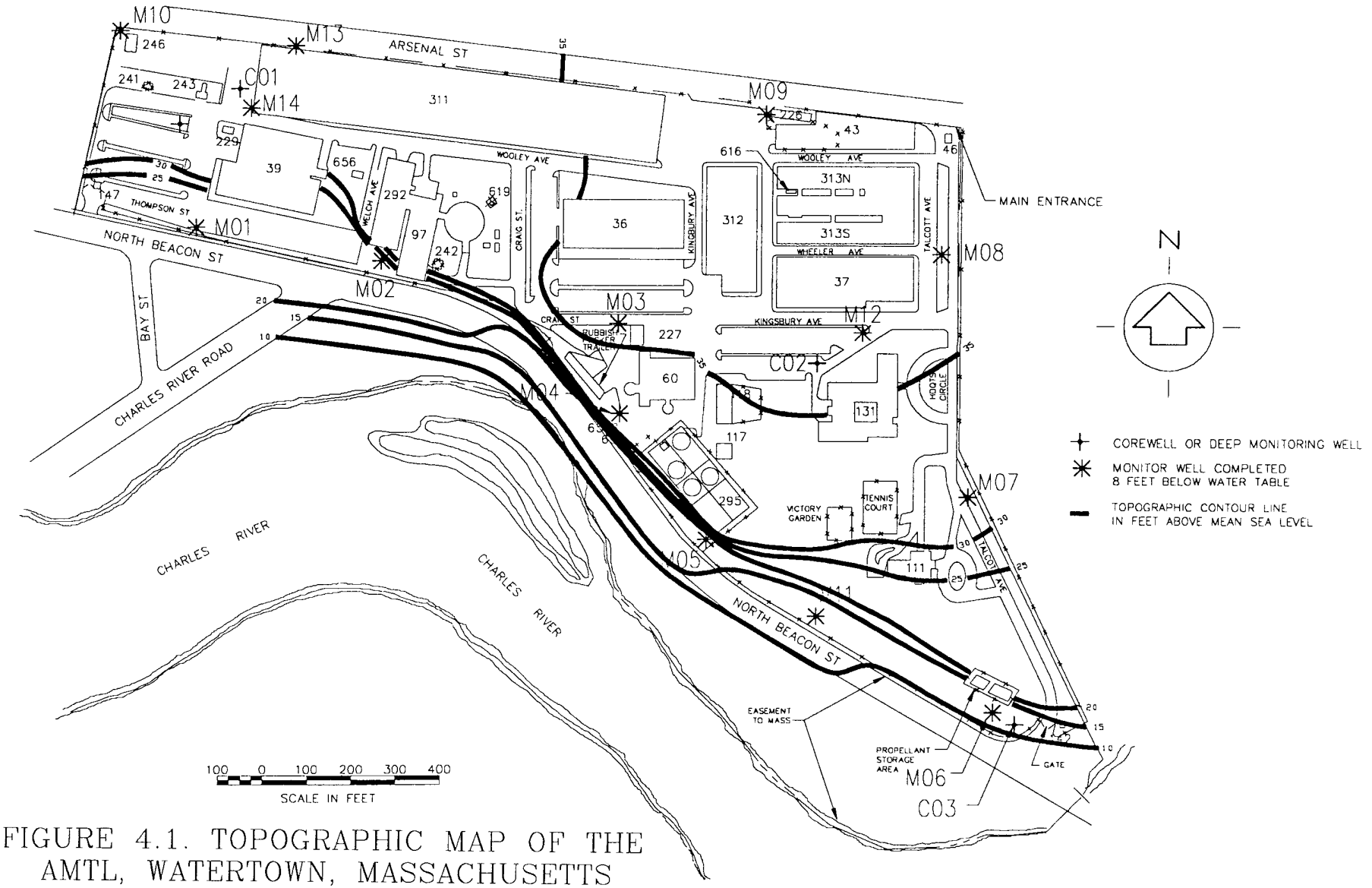


FIGURE 4.1. TOPOGRAPHIC MAP OF THE AMTL, WATERTOWN, MASSACHUSETTS

Source: Arthur D. Little, 1988

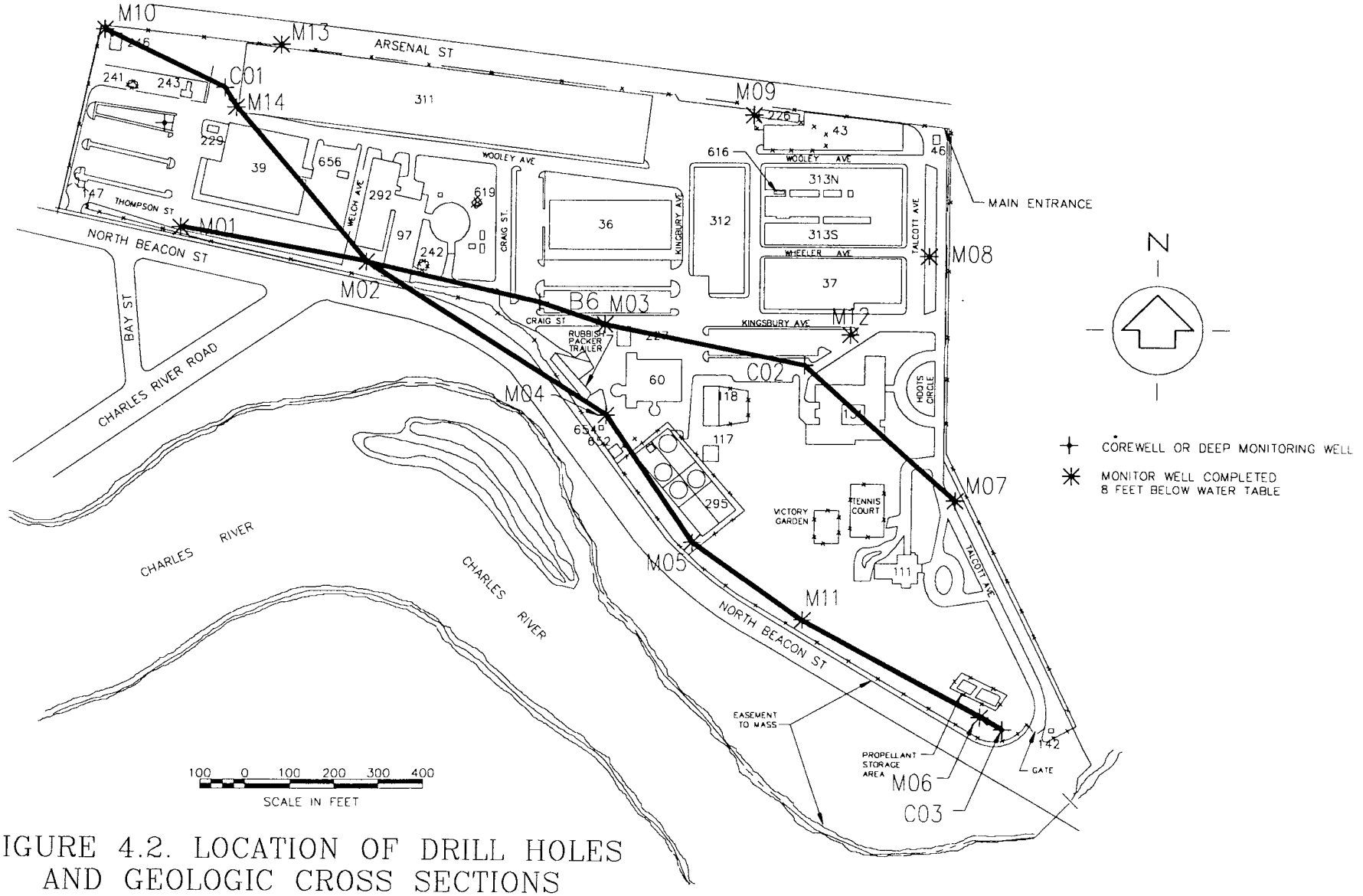


FIGURE 4.2. LOCATION OF DRILL HOLES AND GEOLOGIC CROSS SECTIONS

Source: Arthur D. Little, 1988

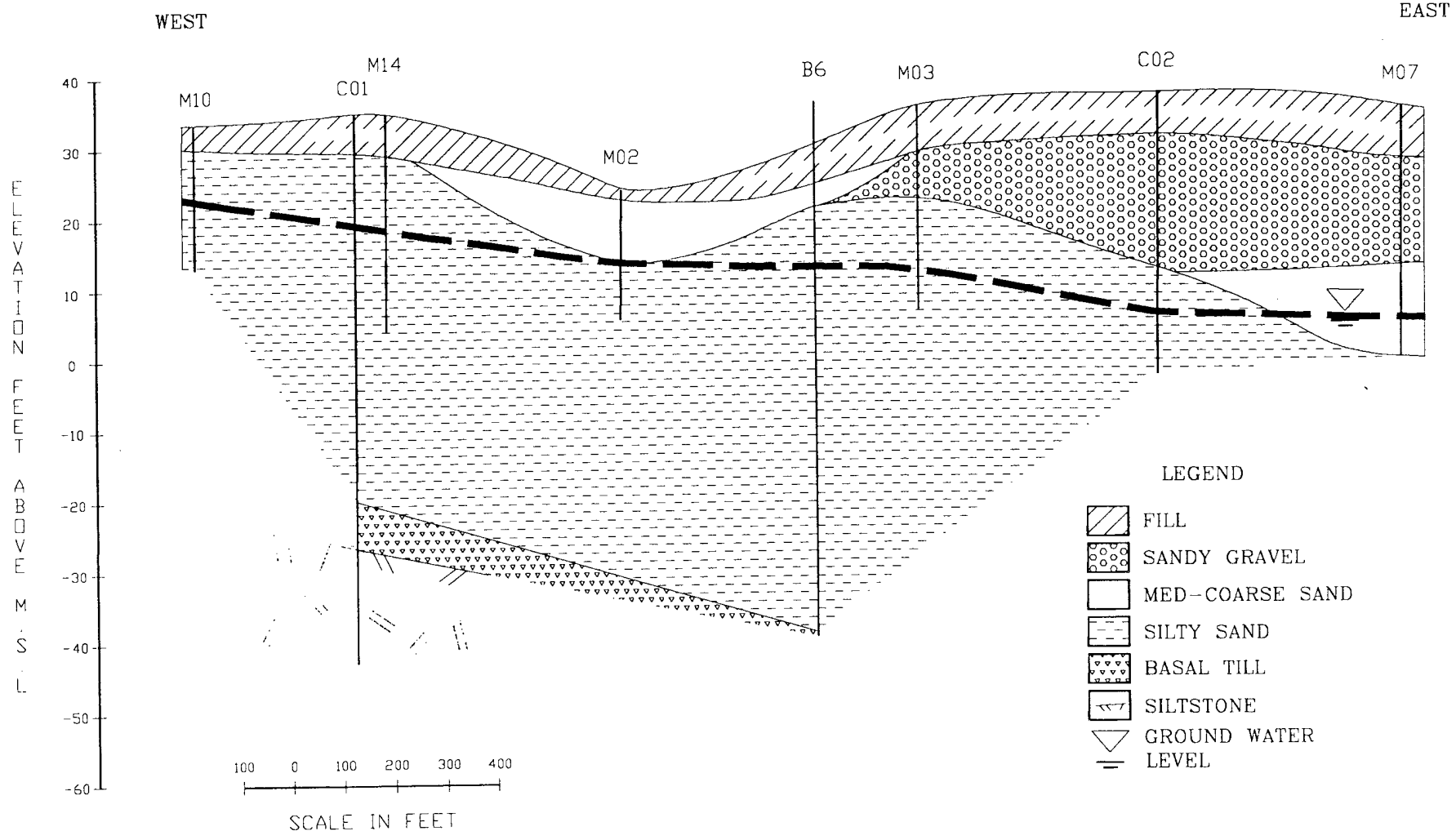


FIGURE 4.3. GEOLOGIC CROSS SECTION M10 – M07

Source: Arthur D. Little, 1988

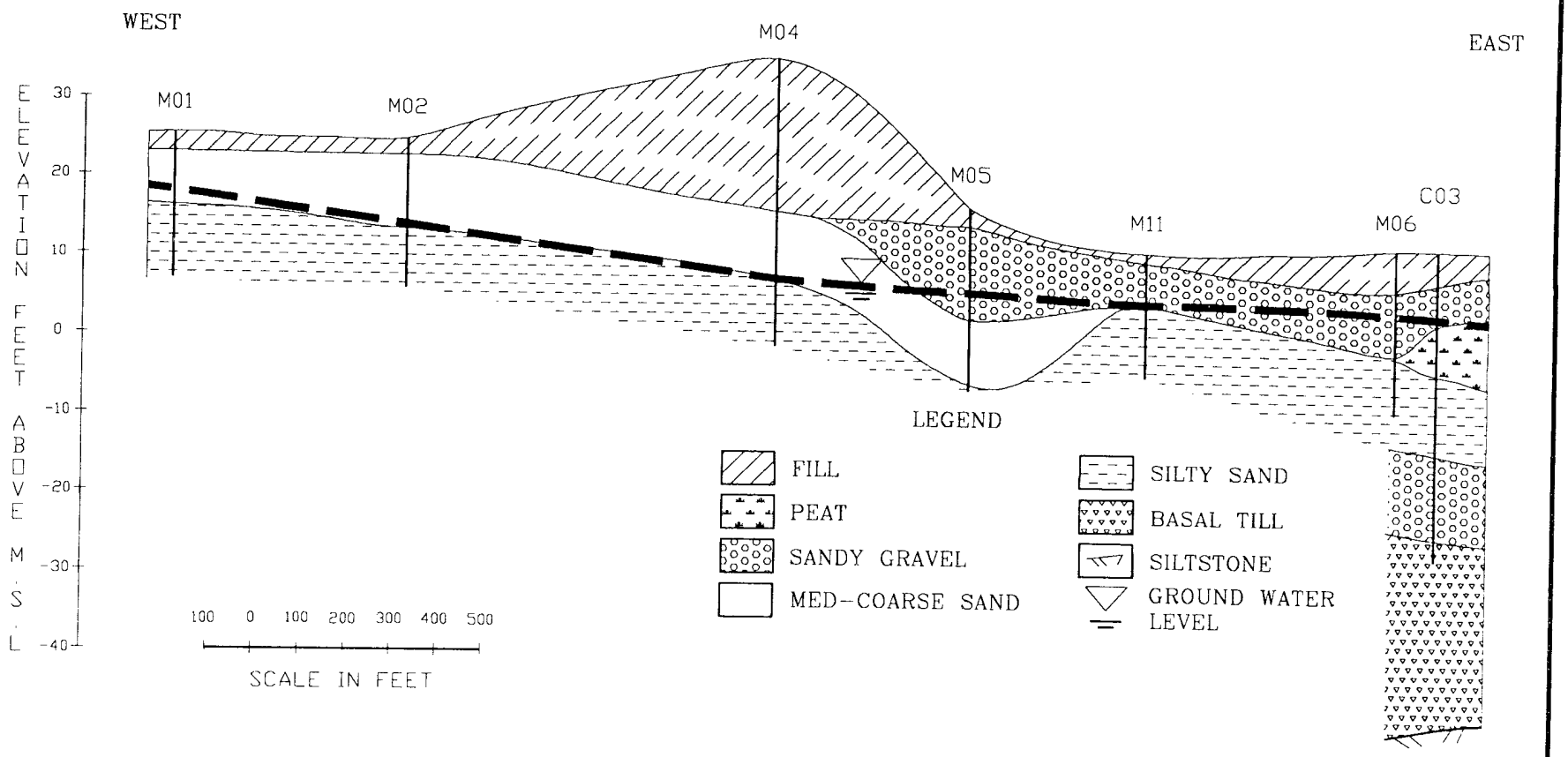


FIGURE 4.4. GEOLOGIC CROSS SECTION M01 – C03

Source: Arthur D. Little, 1988

4.3 Quaternary Geology

Estimates based on drilling (Figure 4.3 and 4.4) and a seismic refraction survey (Figures 4.5 and 4.6), suggest approximately 45 to 120 feet of Quaternary sediments have been deposited over the Cambridge Argillite bedrock at the MTL. While the precise stratigraphy varies from hole to hole, a generalized ascending sequence consists of a basal till of fairly cohesive, silt rich gravel; a moderate to well sorted, olive brown, silty, fine-grained sand; a medium to coarse-grained brown sand, locally grading to about 30% gravel; locally a sandy peat; and finally, fill material or disturbed sand and gravel.

Depth from surface to bedrock was estimated across the site using three seismic refraction profiles (Figure 4.5). The results of these three profiles, shown in Figure 4.6, indicate a generally gently undulating surface. The east-west profile shows a bedrock surface varying from 47 feet (below surface) at the northwest corner of the facility, falling off to about 110 feet and then rising to 90 feet at the northeast corner. The north-south profiles show a decrease in depth from 120 feet at the north to about 65 feet at the south. Based on the east-west seismic refraction profile bedrock at location C01 was predicted at 57 feet; the actual depth, based on drilling was 61.5 feet.

4.3.1 Basal Till

The basal till was encountered in only two holes on site, C01 and C03 and penetrated only in C01. In C01, the till was only six feet thick and consisted of round to subround cobbles of granite and felsic volcanics and subangular fragments of argillite. No split spoon samples were obtained in the till in C01 because of refusal, so the composition of the matrix is not known. In C03, the till consisted of a gray green, silt-rich gravel with angular decomposed rock fragments and medium to coarse-grained sand. While the exact thickness of the till is not known at C03, based on the depth of bedrock estimated from the seismic refraction profile, it would appear to be approximately 25 feet thick. In drilling previously completed to gather geotechnical data for foundation design, the till was encountered in a hole approximately 200 feet west of MW03 at a depth of 76 feet. The till was described as a dense brown, clayey to silty sand with gravel.

4.3.2 Silty Sand

The silty sand is found across the site and is usually comprised of a moderate to well sorted, very fine to fine-grained sand, with a silty-clayey matrix, commonly laminated. Its thickness ranges from approximately 10 feet in C03 to 50 feet in C01. It does not appear to be encountered in MW07 or MW08 and is thinnest in C03, so it may pinch out eastward. Since it was penetrated only in these two holes, it is not possible to make any conclusions regarding systemic variations in thickness. The silty sand probably represents a distal outwash deposit in a lacustrine environment.

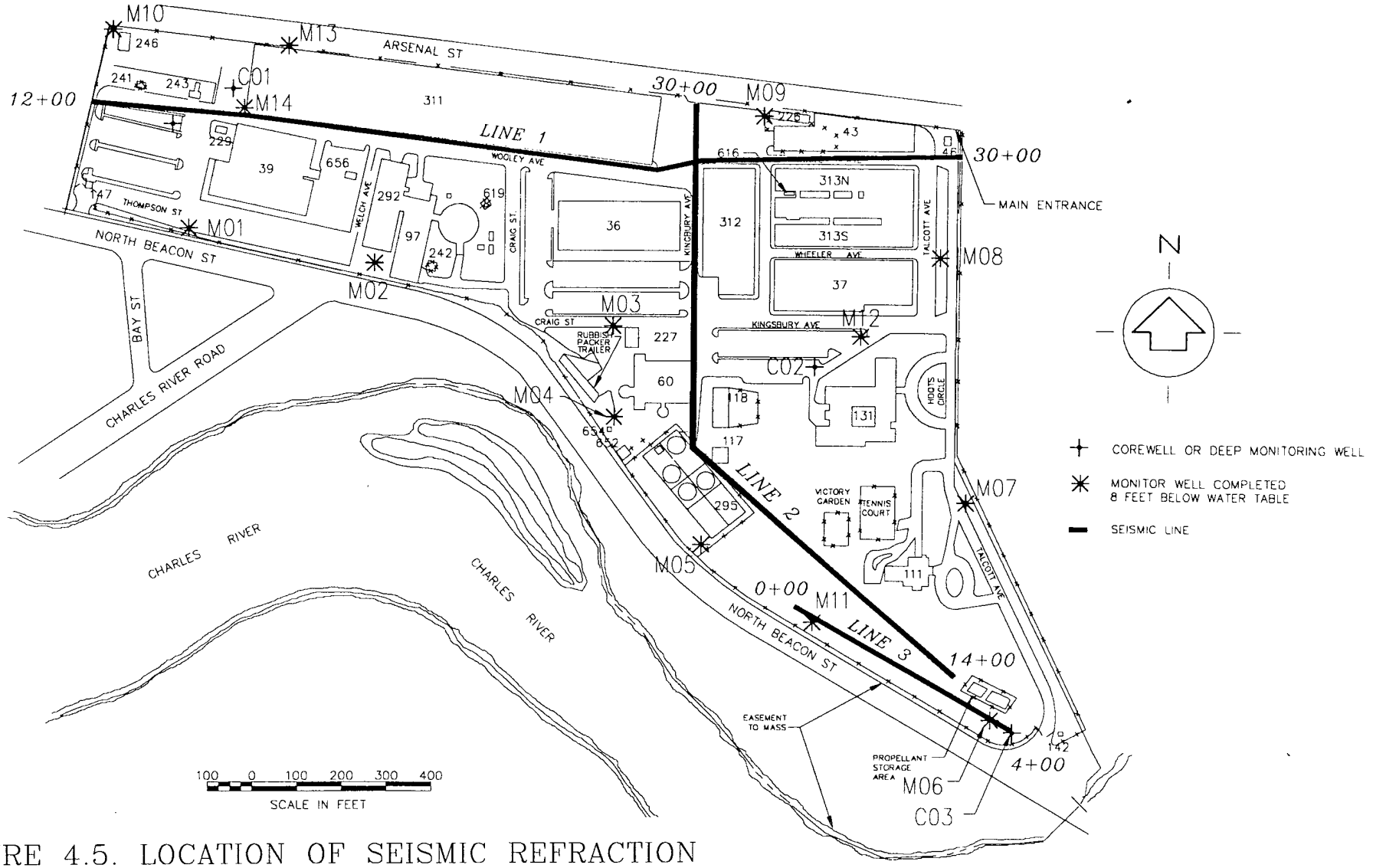
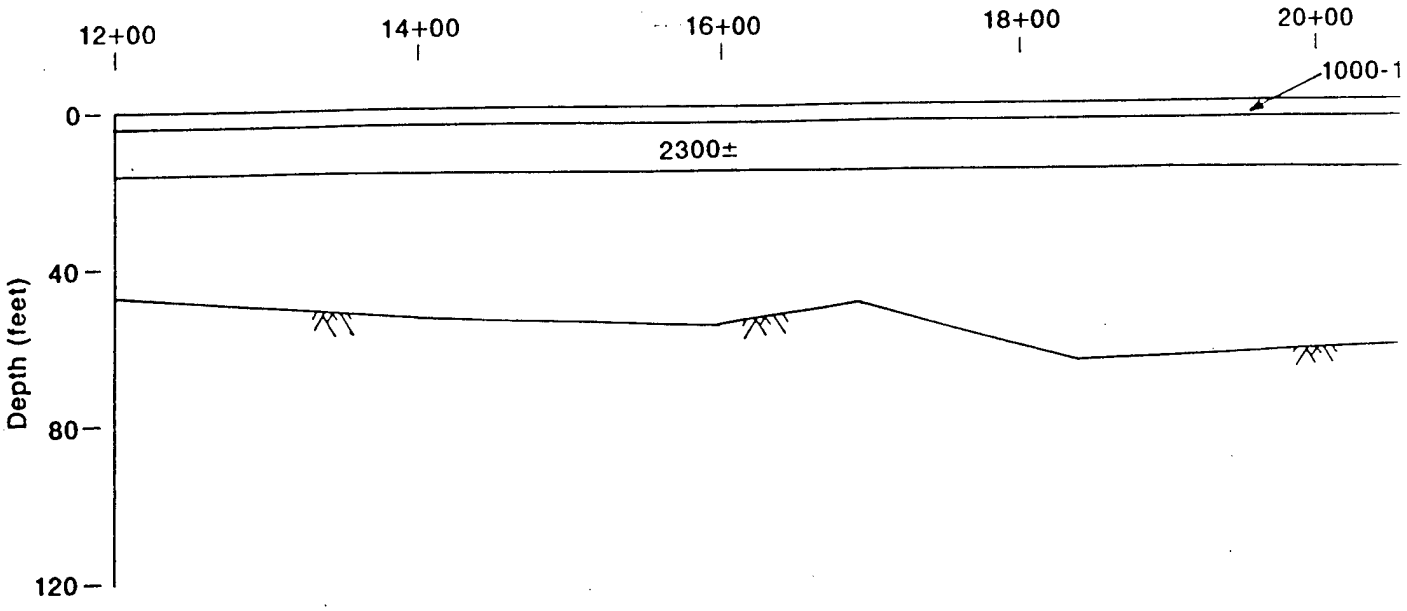
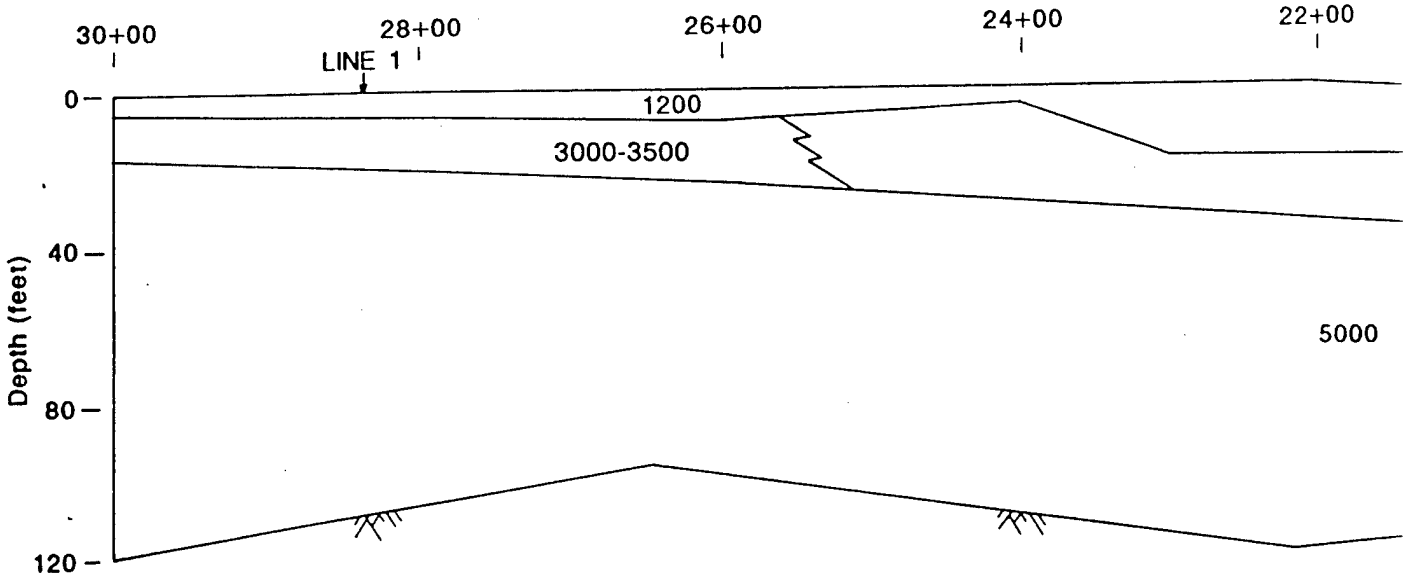


FIGURE 4.5. LOCATION OF SEISMIC REFRACTION PROFILES

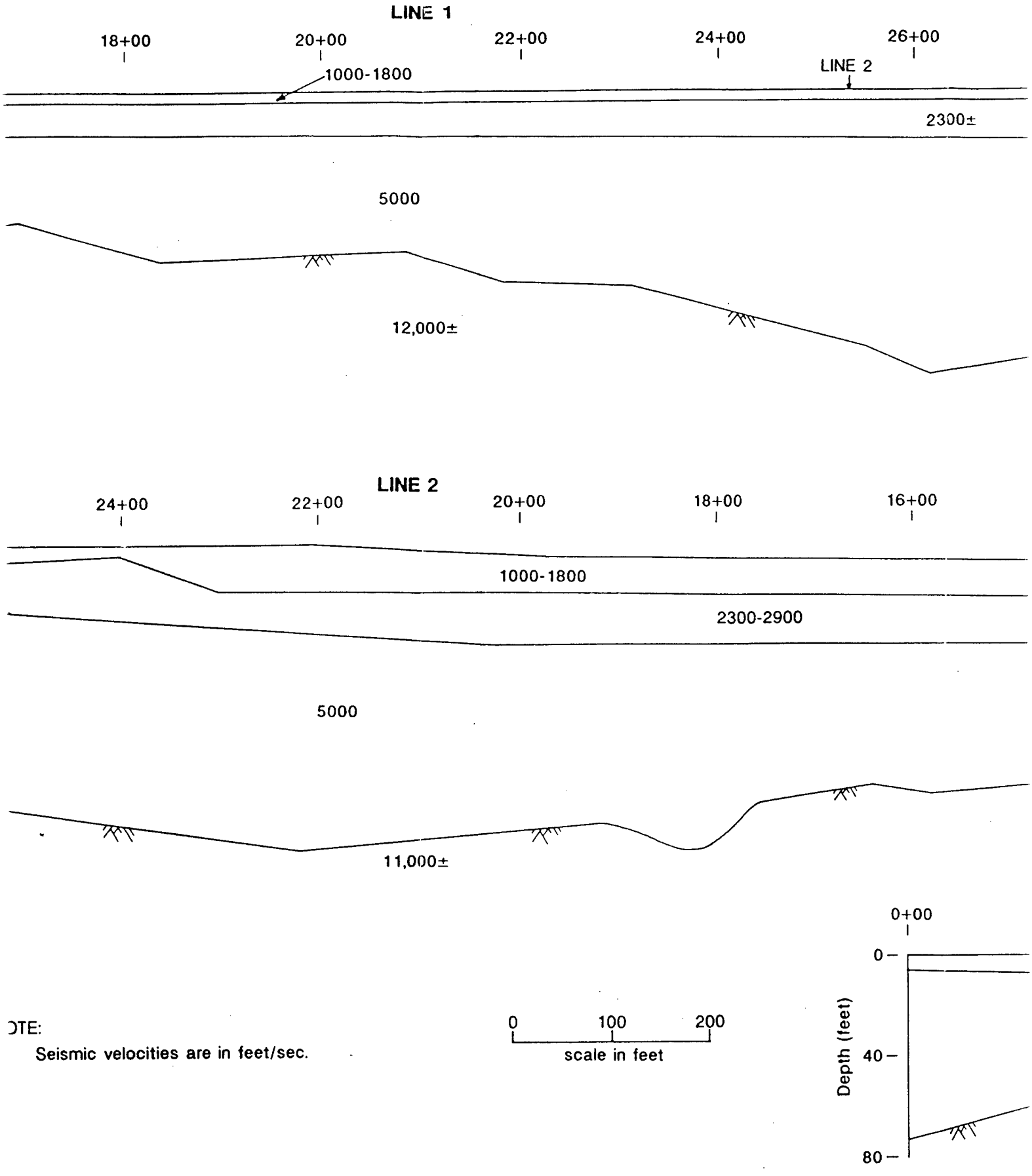
Source: Arthur D. Little, 1988





NOTE:

Seismic velocities are in feet/sec.



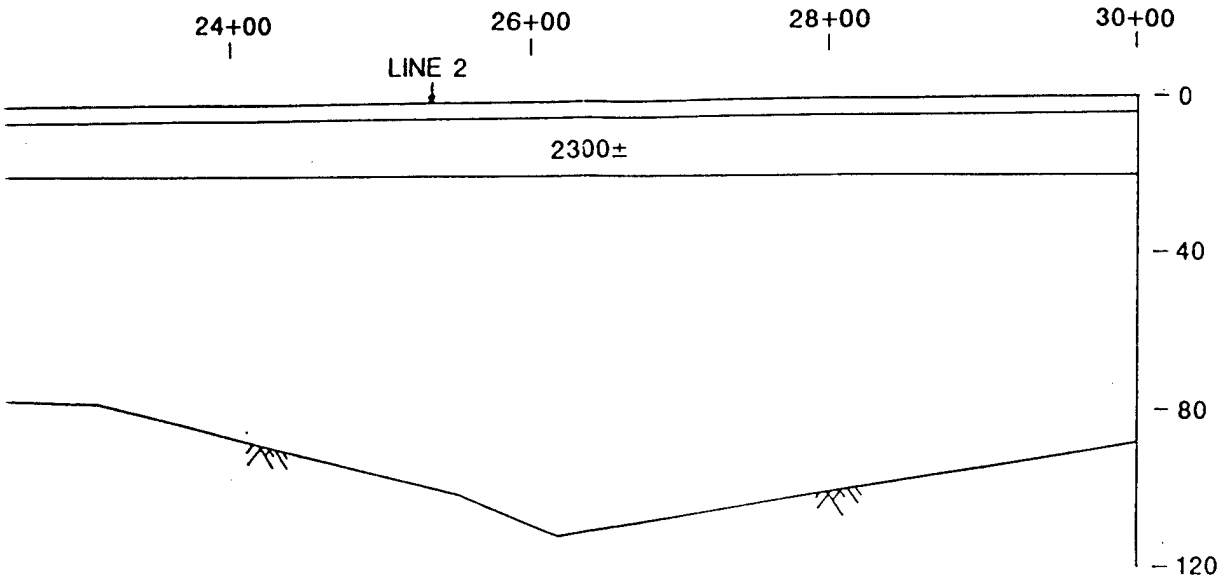
NOTE:

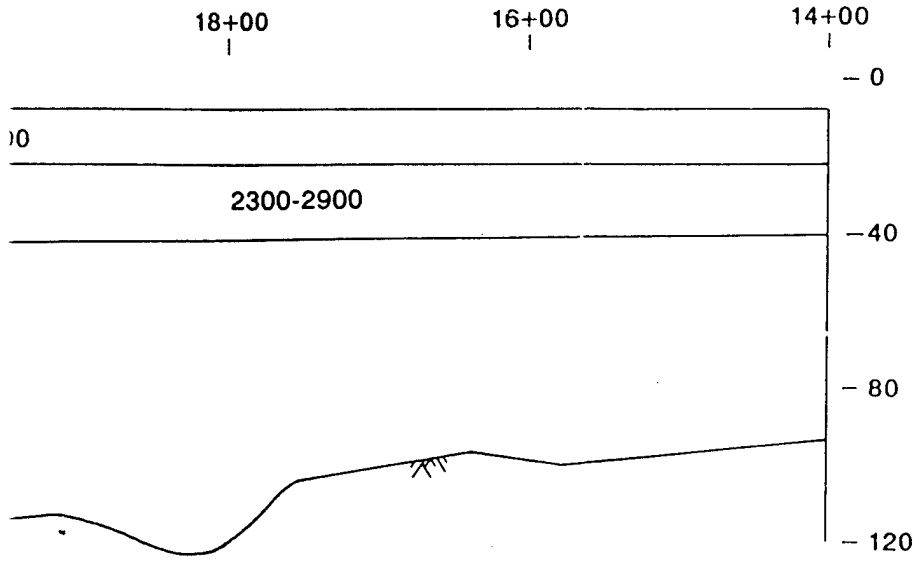
Seismic velocities are in feet/sec.

0 100 200

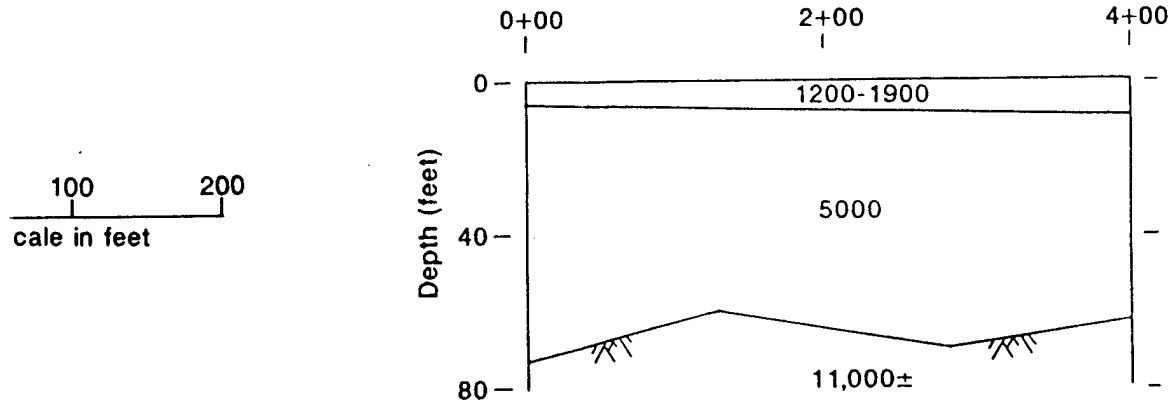
scale in feet

GEOLOGIC AND GEOPHYSICAL
FIELD INVESTIGATIONS
ARMY MATERIALS TESTING LABORAT
WATERTOWN, MASSACHUSETTS
prepared for
A. D. LITTLE, INC.





LINE 3



GEOLOGIC AND GEOPHYSICAL FIELD INVESTIGATIONS ARMY MATERIALS TESTING LABORATORY WATERTOWN, MASSACHUSETTS prepared for A. D. LITTLE, INC.	SEISMIC REFRACTION PROFILES Figure 4.6

(3)

7/88

4.3.3 Medium to Course Sand/Gravel

The medium to coarse-grained sand/gravel unit is highly variable in textural composition and is not found over the entire site. Where encountered, it lays above the silty sand and is overlain by fill and disturbed sands and gravels. It was not encountered in the northwest corner of the facility (Figure 4.3) and seems to grade from a medium to coarse-grain, well sorted, brown sand in the west portion of the facility to a yellowish brown, poorly sorted, gravel (30-40% pebbles and cobbles) with a poorly sorted, fine to coarse-grained sand matrix to the east. It ranges in thickness from absent to more than 35 feet, but averages approximately 10 feet. It is sometimes difficult to distinguish the gravel from disturbed or fill material, but in most cases the fill gravels were grayish brown and contained exotic debris such as brick, slag, concrete, and ceramics. The sand/gravel deposits probably represent fluvial (glacial meltwater) deposits.

4.3.4 Peat

In C03 at the southeast corner of the facility (Figure 4.4), a sequence of organic rich sand and sandy peat was encountered. This is the lowest portion of the MTL (11.9 feet), about 9 to 10 feet above normal Charles River elevation. The sandy peat probably represents a flood plain wetland deposit and consisted of grayish brown woody plant fragments and silty fine sand. When exposed to air, the peat gave off a sulfurous odor and immediately oxidized to a black brown color. Peat was not encountered in MW11 or MW06, the other low elevation hole locations.

4.3.5 Fill and Surficial Soils

Fill at the MTL facility is variable in distribution and thickness but is generally less than 20 feet. Usually the fill consists of poorly sorted sandy gravel, grayish brown in color. It commonly contains exotic debris such as brick, slag, concrete, and ceramics which can be used to distinguish it from the underlying fluvial gravels.

The surficial soil at the MTL is classified as Merrimac gravelly sand loam. It consists of 6 to 10 inches of dark brown gravelly sandy loam overlying 15 to 25 inches of yellow brown, friable gravelly sandy loam. The soil has been repeatedly disturbed during the history of the MTL by various construction activities.

4.4 Hydrology

The following description of hydrology at the MTL facility is taken from the 1988 Arthur D. Little report, Geotechnical report, Army Materials Technology Laboratory, Watertown, Massachusetts.

4.4.1 Surface Water

Surface water run-off and natural drainage at the MTL has been greatly influenced by modifications made to the natural land surface by construction of various structures and paved areas such as roads and parking lots. Watertown, in the

vicinity of the MTL, is heavily developed. The nearest pond, Swains Pond, is approximately 3,000 feet east of the MTL. The Charles River, one of the primary drainages in the Metropolitan Boston area, borders the site to the south. There are no known streams or other natural drainages to the Charles River in the vicinity of the MTL. Current surface drainage is dominantly to the storm sewer system which discharges into the river. Some natural run-off will follow topography toward the river. Natural recharge through seepage is probably quite minimal in the vicinity of the MTL because of the number of structures and paved areas.

4.4.2 Groundwater

Characterization of groundwater hydraulics at the MTL is based on 17 borings and 16 monitor wells installed at the site during May and June of 1988. Water level measurements were taken and in situ permeabilities measured by falling and rising head tests. Hydraulic parameters are summarized in Table 4.1.

Water level measurements taken at all wells and the Charles River on July 13, 1988 and February 8, 1990 (Table 4.2). Groundwater contours are estimated based on the 1988 data. These contours indicate flow is generally to the south, toward the River. In the northeast corner of the site, flow is to the southeast initially and then swings around to the south. Using the contours shown in Figure 4.7, gradients were estimated (Table 4.1). Figure 4.8 shows groundwater contours for the well measurements taken February 8, 1990.

Hydraulic conductivities (k) were calculated by the method of Hvorslev (Freeze and Cherry, 1979) using measurements of the maximum displacement of water and subsequent recoveries to equilibrium as a function of time (slug tests). The hydraulic conductivities calculated from the falling head and rising head tests are presented in Table 4.3 along with laboratory measurements of hydraulic conductivity. The results from monitor wells MW03, MW04, MW07 and MW14 are of questionable quality due to the erratic nature of the data; therefore, they are not used in our characterization of groundwater hydraulics.

The test results can be categorized based on the material in which the well was screened. Using data from monitor wells screened in silty sand (C02, C03, MW05, MW06, MW09, and MW11) an average value of k is 6.4×10^{-3} m/sec with a range from 7.06×10^{-4} to 1.30×10^{-2} cm/sec. For the medium to coarse-grained sandy gravel (MW01, MW02, MW08, MW12, and MW13) an average value of k is 2.7×10^{-2} cm/sec with a range from 4.24×10^{-3} to 3.30×10^{-2} cm/sec. These values are within expected ranges of values for silty sand (10^{-5} to 10^{-1} cm/sec) and sand (10^{-3} to 1 cm/sec) (Freeze and Cherry, 1979).

Hydraulic conductivity of the bedrock, the Cambridge Argillite (actually a siltstone), was determined by pressure testing of a packed bedrock interval (68-78 feet). Values of k ranged from 1.72×10^{-7} to 8.88×10^{-7} cm/sec and averaged 4.1×10^{-7} cm/sec. A value of 10^{-7} cm/sec is at the high end of the range for shale

Table 4.1 Hydraulic Parameters

1. Gradient (i)

a. West portion: 0.025 to south.
b. East central portion: 0.030 to southeast, swings to 0.005 to south.

2. Hydraulic Conductivity (k)

a. Silty sand:
6.4×10^{-3} cm/sec (average)
7.06×10^{-4} - 1.30×10^{-2} cm/sec (range)

b. Medium-coarse sandy gravel:
2.7×10^{-2} cm/sec (average)
4.24×10^{-3} - 3.30×10^{-2} cm/sec (range)

c. Siltstone:
4.1×10^{-7} cm/sec (average)
1.72×10^{-7} - 8.88×10^{-7} cm/sec (range)

3. Flow Rate (Q)

a. 0.016 m^3/sec (98 gpm).

4. Flow Velocity (v)

a. Site average: 4.5×10^{-4} cm/sec (142 m/year).
b. Southeast portion: 4.5×10^{-5} cm/sec (14.2 m/year).

Table 4.2 Groundwater Surface Elevations

Monitor Well	Elevation of Well* (Feet M.S.L.)	July 13, 1988 Water Depth** (Feet)	July 13, 1988 Water Elevation (Feet M.S.L.)	February 8, 1990 Water Depth** (Feet)	February 8, 1990 Water Elevation (Feet M.S.L.)
C02	37.49	31.63	5.86	30.99	6.5
C03	11.90	8.45	3.45	8.13	3.78
M01	24.98	7.56	17.42	6.71	18.27
M02	24.04	10.49	13.55	9.25	14.79
M03	36.63	23.75	12.88	22.33	14.30
M04	36.52	29.19	7.33	28.25	8.27
M05	15.93	10.82	5.11	9.32	6.61
M06	11.96	8.15	3.81	7.44	4.52
M07	34.84	29.67	5.17	29.88	4.97
M08	39.48	33.70	5.78	33.15	6.33
M09	37.03	16.77	20.26	12.53	24.50
M010	32.86	11.00	21.86	9.05	23.81
M011	11.01	6.17	4.84	4.77	6.24
M012	38.52	32.14	6.38	32.23	6.29
M013	35.30	13.19	22.11	12.30	23.00
M014	35.49	17.19	18.30	15.54	19.95

* Elevation of well is ground surface because of flush mount.
** Depth below ground surface.

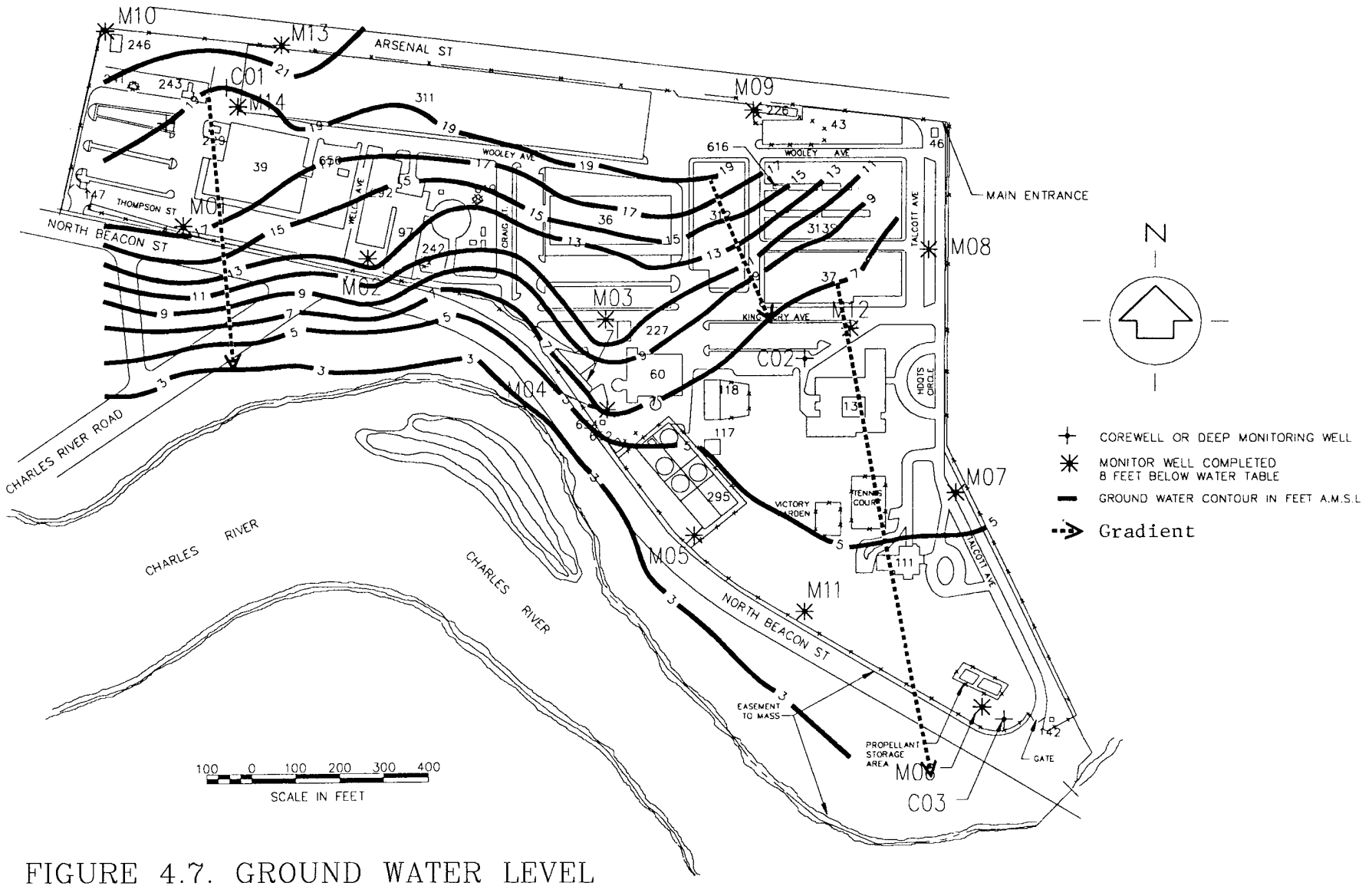


FIGURE 4.7. GROUND WATER LEVEL CONTOUR MAP

Source: Arthur D. Little, 1988

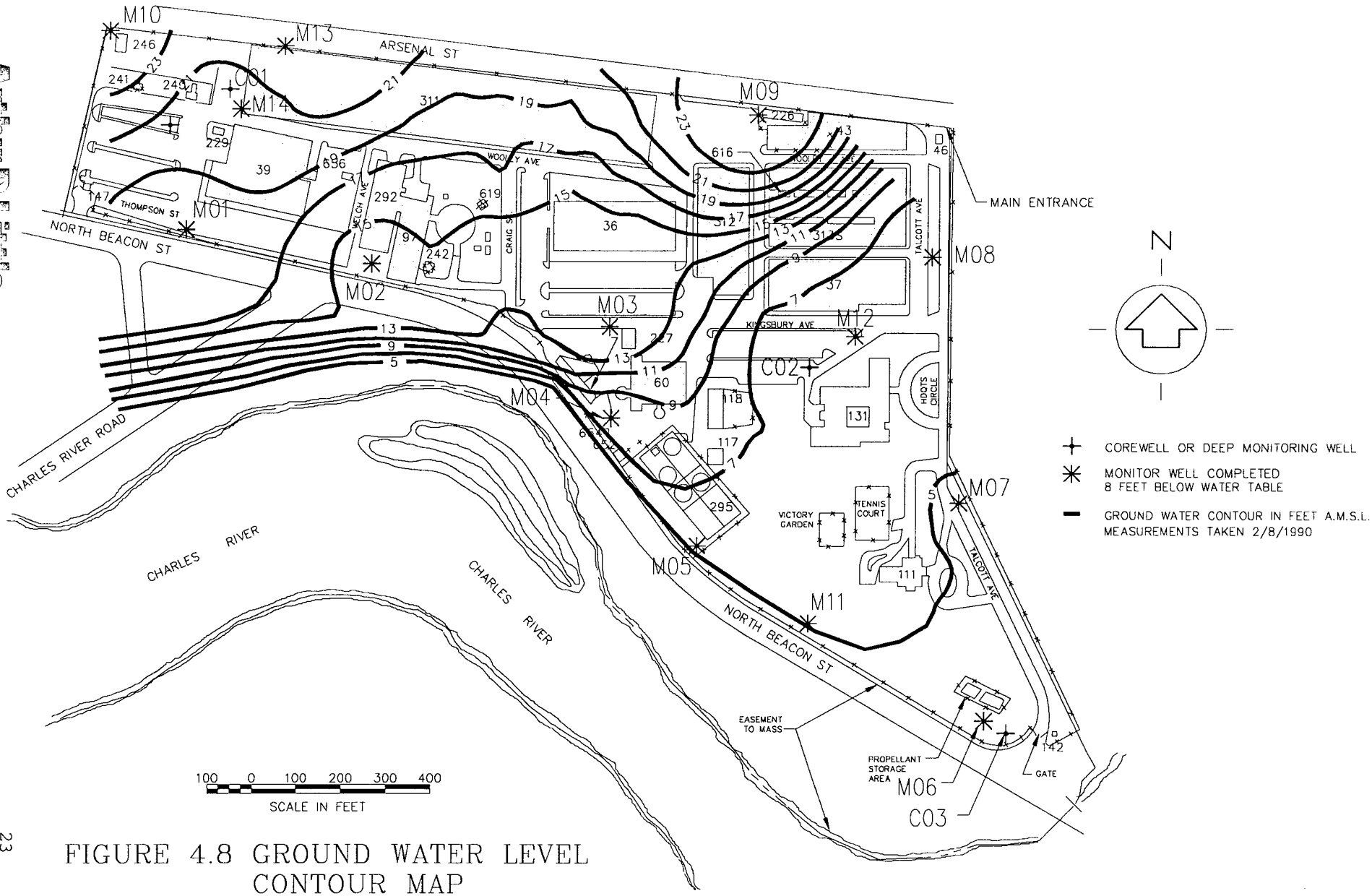


FIGURE 4.8 GROUND WATER LEVEL CONTOUR MAP

Table 4.3 Calculated in Situ Hydraulic Conductivity Measurements

Well No.	Lithology	Hydraulic Conductivity (cm/sec) Rising Head	Falling Head	Laboratory
C01	Silty sand	-	-	2.2×10^{-6}
C02	Silty sand	9.53×10^{-3}	3.35×10^{-2}	-
C03	Silty sand	9.53×10^{-3}	9.18×10^{-3}	1.0×10^{-7}
MW01	Medium-coarse sand	1.20×10^{-2}	2.75×10^{-2}	2.5×10^{-7}
MW02	Fine-coarse sand	2.82×10^{-2}	3.35×10^{-3}	1.5×10^{-6}
MW03	Silty sand	4.24×10^{-2}	*	-
MW04	Fine-coarse sand	2.47×10^{-2}	*	-
MW05	Silty sand	1.34×10^{-2}	*	-
MW06	Silty sand	6.35×10^{-2}	1.06×10^{-3}	-
MW07	Fine-coarse sand	6.35×10^{-2}	*	-
MW08	Medium sand	3.32×10^{-2}	1.66×10^{-2}	-
MW09	Silty sand	4.24×10^{-3}	3.04×10^{-2}	-
MW10	Medium sand	4.24×10^{-3}	6.71×10^{-3}	-
MW11	Silty sand	7.06×10^{-4}	1.41×10^{-3}	-
MW12	Fine-medium sand	3.00×10^{-2}	6.00×10^{-2}	-
MW13	Fine-coarse sand	2.29×10^{-2}	3.07×10^{-2}	-
MW14	Silty sand	1.09×10^{-2}	*	6.0×10^{-7}

* Indicates erratic or insufficient data or insufficient displacement of water level.
- Indicates laboratory tests could not be run.

(10^{-7} to 10^{-11} cm/sec) confirming some fracturing is present int he siltstone, at least near the surface. Compacted natural clay liners for solid waste landfills are in the range of 10^{-7} to 10^{-8} cm/sec, so by comparison, the siltstone does provide an effective basal confining layer for the overlying aquifer in unconsolidated glacial sediments.

We did not determine an in situ hydraulic conductivity for the basal till. Values of k reported by Hatheway (1982) range from 10^{-5} to 10^{-9} cm/sec.

Locally, the hydraulics of groundwater movement beneath the site are controlled by the confining nature of the bedrock and the hydraulic conductivity of the silty sand. Groundwater shows a general gradient 0.03 to the south. West of MW03, the gradient increases slightly as the water encounters the lower conductivity of the silty sand. As the silty sand grades to coarser sand and sandy gravel eastward, the hydraulic conductivity increases and the gradient decreases.

To calculate a representative flow rate (Q), a cross sectional area perpendicular to the gradient extending from near MW01, then east to near MW03, and finally northeast to near MW08, approximately 2,000 feet in length was selected. The aquifer thickness (H) ranged from approximately 40 feet at the west to 47 feet at the east. We assumed that the siltstone provided an effective basal confining layer for the aquifer. The cross sectional flow area was estimated at 8080 m^2. Review of the drill logs and cross section MW10-MW07 (Figure 4-3) suggests that the silty sand is the predominate hydrologic unit. Review of the seismic fairly uniform material, based on consistent seismic velocities of 5,000 feet/sec. Based on the preceding arguments, a hydraulic conductivity of 6.4 x 10^{-3} cm/sec, the average for the silty sand, was used. An average gradient (i) of 0.03 was selected. The flow rate, Q, can now be calculated:

$Q = k\ i\ A$
$= 0.016\ m^3/sec$ (98 gpm)
$= 504576\ m^3/year$ (51,508,800 gal/year)

Representative average linear velocities can be calculated by:

$v = ki/n$

Using an average porosity (n) of 0.43 for the silty sand, gradients (i) of 0.03 and 0.003 and the average hydraulic conductivity (k) for the silty sand, calculated flow velocities range from 6.4 x 10^{-4} cm/sec (142 m/year) to 4.5 x 10^{-5} cm/sec (14.2m/year) where 4.5 x 10^{-4} cm/sec is most representative over all but the southeast corner of the site. Since the average porosity (n) determined in laboratory testing is lower than the effective porosity, these average linear velocities represent lower limits of linear velocity.

5.0 Sampling Activities

Arthur D. Little was retained by EG&G Idaho, Inc. to conduct sampling activities at the Materials Technology Laboratory, in Watertown, Massachusetts. The objective of the "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling was intended to duplicate, to the extent possible, the sampling performed in 1988. Our sampling program extended from February 8 to February 23, 1990, and consisted of the collection of the following samples:

- 18 ground water samples at 16 existing monitoring wells, which included two duplicates;
- 22 shallow soil samples, which included two duplicates;
- 3 storm sewer sediments;
- 7 outfall 24-hour composite samples;
- 8 tank and sump samples (3 sludge, 2 aqueous, 3 oil); and,
- 1 water sample from the reactor emergency coolant tank.

The final list of samples varied from the original scope in that, the water sample from the reactor emergency cooling tank was added, one 24-hour composite outfall sampling site was added, one of the sumps was dry (07AQU01), so a sludge sample was taken instead of an aqueous sample, and one sludge (05SLG01) was not taken upon direction from EG&G.

Table 5.1 lists the sample identification, type, location and compounds analyzed. Figures 5.1 through 5.5 show the locations of ground water, soil, storm sewer sediment, outfall and tank and sump samples.

Copies of original field documentation, including Ground Water Monitoring Reports, Soil Sample Logs, Monitoring Well Sampling Data Sheets, Tank and Sump Sampling Data Sheets, and Chain-of-Custody Forms are included in the tabbed appendices.

5.1 Ground Water Samples

Eighteen ground water samples were taken from 16 monitoring wells, originally installed in 1988. Of the 18, two were duplicate samples taken on the day following the original sample, without repurging the well.

Table 5.1: Proposed Samples and Analytes

Sample No.	Analysis to be Performed
Groundwater Samples	
C0-2	Complete analysis[1]
C0-3	Complete analysis[1]
MW-01	Complete analysis[1]
MW-02	Complete analysis[1]
MW-03	Complete analysis[1]
MW-04	Complete analysis[1]
MW-05	Complete analysis[1]
MW-06	Complete analysis[1]
MW-07	Complete analysis[1]
MW-08	Complete analysis[1]
MW-09	Complete analysis[1]
MW-10	Complete analysis[1]
MW-11	Complete analysis[1]
MW-12	Complete analysis[1]
MW-13	Complete analysis[1]
MW-14	Complete analysis[1]
C0-2 duplicate	Complete analysis[1]
MW-04 duplicate	Complete analysis[1]

Table 5.1 (continued)

Sample No.	Sample Location	Depth	Analysis to be Performed
Shallow Soil Samples			
01SOL01	W side of Bldg. 243	1-6 inches	Complete analysis[1]
02SOL01	Steel floor Bldg. 311	1-6 inches	Complete analysis[1]
03SOL01	Transformer Case, NW side Bldg. 43	1-6 inches	PCB
06SUB01	S of Bldg. 100	6-18 inches	Complete analysis[1]
06SOL01	Transformer area NE side of Bldg. 100	1-6 inches	PCB
09SOL01	Transformer cage W side of Bldg. 313	1-6 inches	PCB
09SOL02	Transformer cage E side of Bldg. 313	1-6 inches	PCB
12SUB01	Grass area S of Bldg. 60	6-18 inches	Complete analysis[1]
13SOL01	Transformer area, S of Bldg. 131	1-6 inches	PCB
14SUB01	SE Corner, unit 14	6-18 inches	Complete analysis[1]
14SUB02	NW corner, unit 14	1-6 inches	Complete analysis[1]
15SOL01	SE corner, unit 15	1-6 inches	Complete analysis[1]
15SOL02	NW corner, unit 15	1-6 inches	Complete analysis[1]
17SUB01	W third, unit 17	6-18 inches	Complete analysis[1]
17SUB02	Center, unit 17	6-18 inches	Complete analysis[1]
17SUB03	E third, unit 17	6-18 inches	Complete analysis[1]
17SOL01	E third, unit 17	1-6 inches	Complete analysis[1]
17SOL02	Middle third, unit 17	1-6 inches	Complete analysis[1]
01SOL01 duplicate	W side of Bldg. 243	1-6 inches	Complete analysis[1]
06SUB01 duplicate	S of Bldg. 100	6-18 inches	Complete analysis[1]

Table 5.1 (continued)

Sample No.	Sample Location	Sample Type	Analysis to be Performed
Storm Sewer Samples			
01SED01	Storms sewer, NW corner unit 1	Sediment	Complete analysis[1]
09SLG01	Storm sewer, corner of Wooley and Talcott	Sediment	Complete analysis[1]
12SLG01	Storm drain, unit 12	Sediment	Complete analysis[1]
Tank and Sump Samples			
01AQUO1	Sump, E side of Bldg. 243	Liquid	Complete analysis[1]
030IL01	W tank, Bldg. 226	Oil	Complete analysis[1]
030IL02	E tank, Bldg. 226	Oil	Complete analysis[1]
03SLG01	Floor, Bldg. 226	Sludge	Complete analysis[1]
05SLG02	Sewer cleanout W side Bldg. 39	Sludge	Complete analysis[1]
050IL01	Tank, E side of Bldg. 39	Oil	Complete analysis[1]
06AQU01	Underground tank, SE of Reactor	Liquid	Complete analysis[1]
07AQU01	Sump, Bldg. 36	Sludge	Complete analysis[1]
09AQU01	Cistern under Bldg. 313C	Liquid	Complete analysis[1]

Table 5.1 (continued)

Sample No.	Sample Location	Depth	Analysis to be Performed
Sewer Outfall Samples (24 Hour Composite)			
16AQU01	SE Guard Gate, Bldg. 42		Complete analysis[1]
17AQU01	SE of Bldg. 6252		Complete analysis[1]
17AQU02	E of Tank Farm		Complete analysis[1]
18AQU01	E of MW-01, Parking Lot S of Bldg. 39		Complete analysis[1]
18AQU02	Wooley Ave, NE Corner Bldg. 292		Complete analysis[1]
18AQU03	Lawn S of Reactor		Complete analysis[1]
18AQU04	E of MW-02, SE Corner Bldg. 292		Complete analysis[1]
Blank Samples			
TB	Trip blanks with volatile organic samples	As required	Volatile organics
FB	Field blanks - 2 for soil and 2 for ground water		Complete analysis[1]

[1]Complete analysis includes volatile organics, semivolatile organics, (base/neutral/acid extractables), pesticides, PCBs, metal (A1, Sb, As, Ba, Be, Cd, Cu, Cr, Co, Ca, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, T1, U, Sm, V, Zn), cyanide, and sulfide.

Metals analysis of groundwater samples refers to dissolved metals.

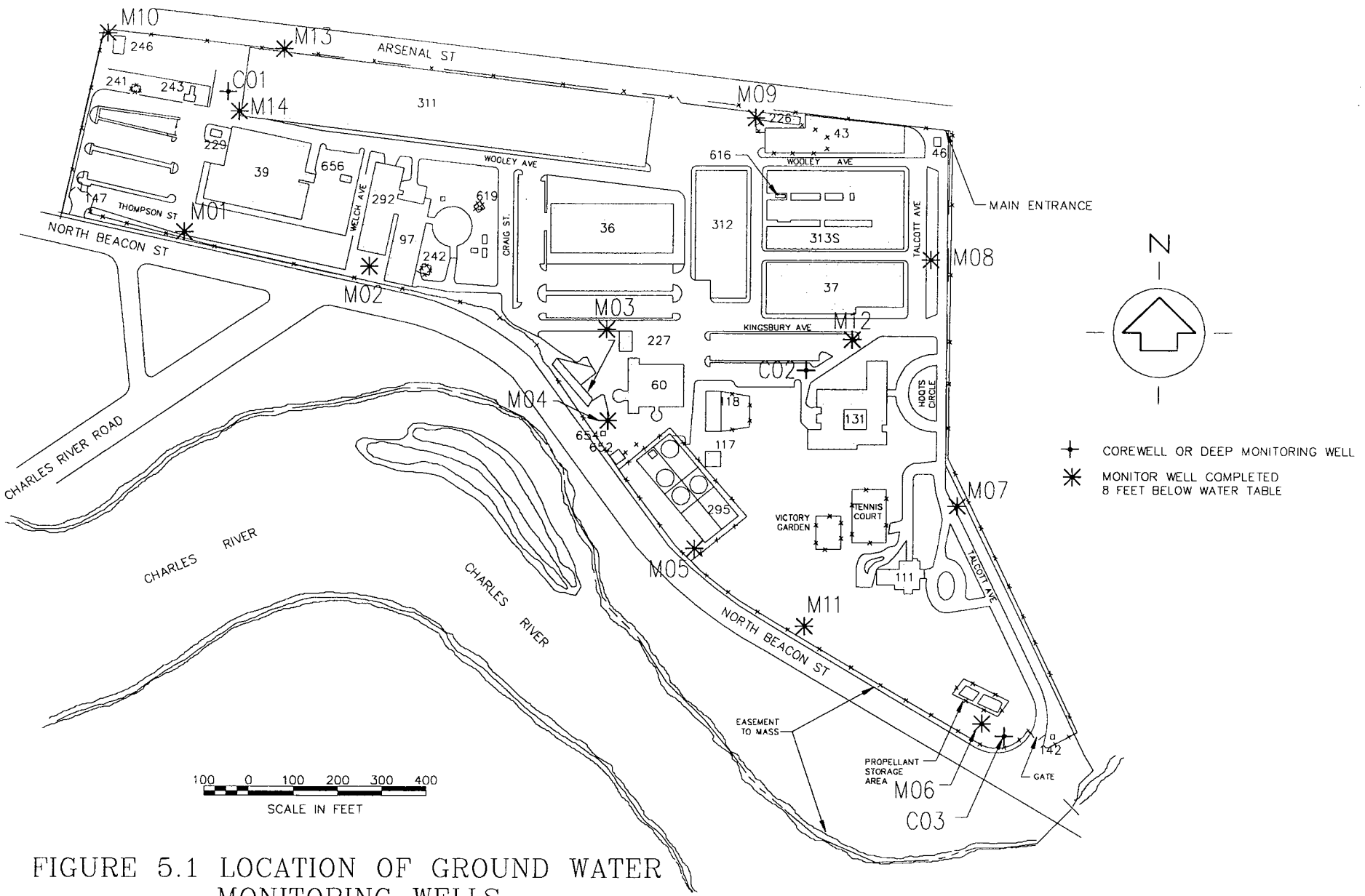


FIGURE 5.1 LOCATION OF GROUND WATER MONITORING WELLS

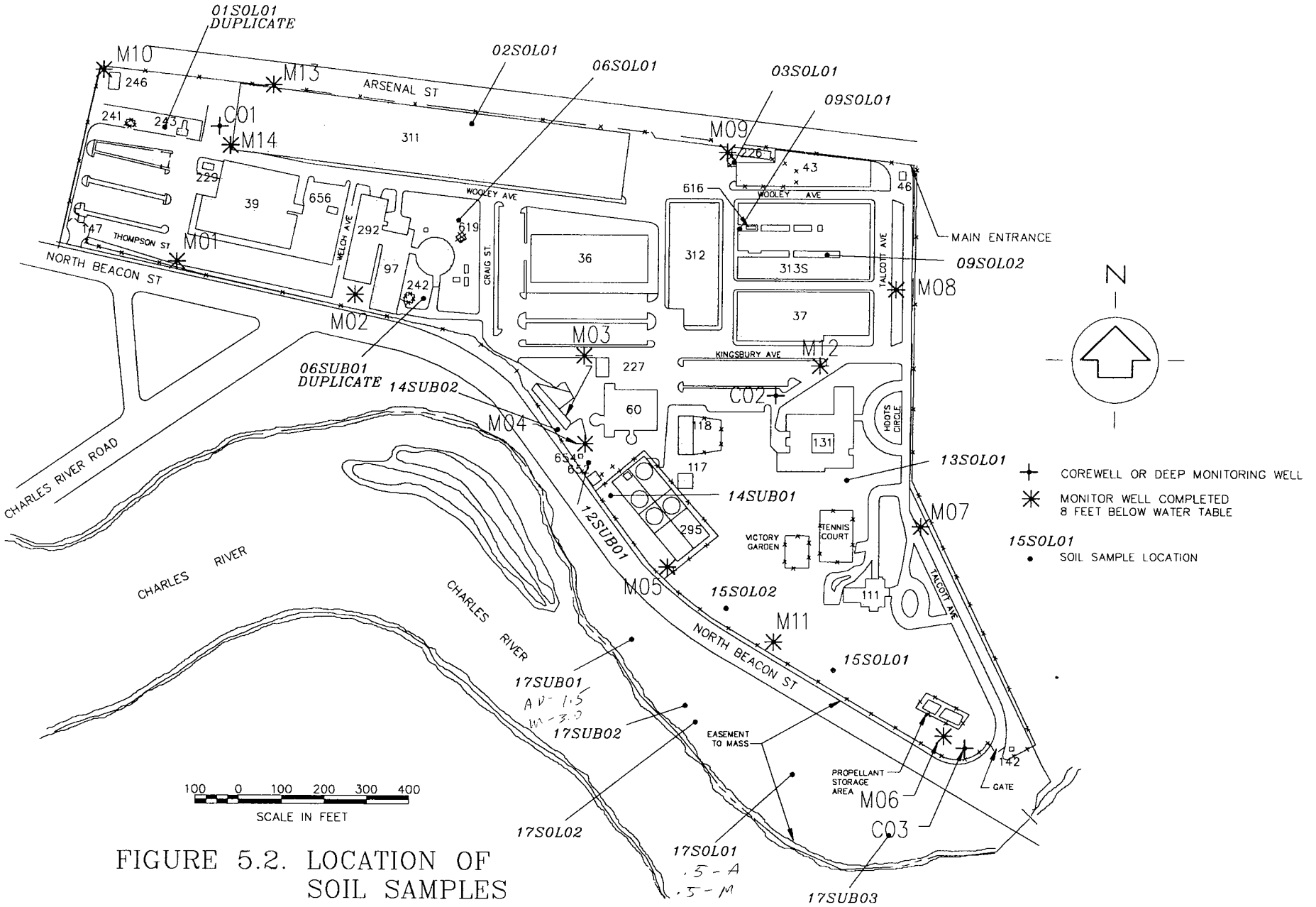


FIGURE 5.2. LOCATION OF SOIL SAMPLES

Source: Arthur D. Little, 1988

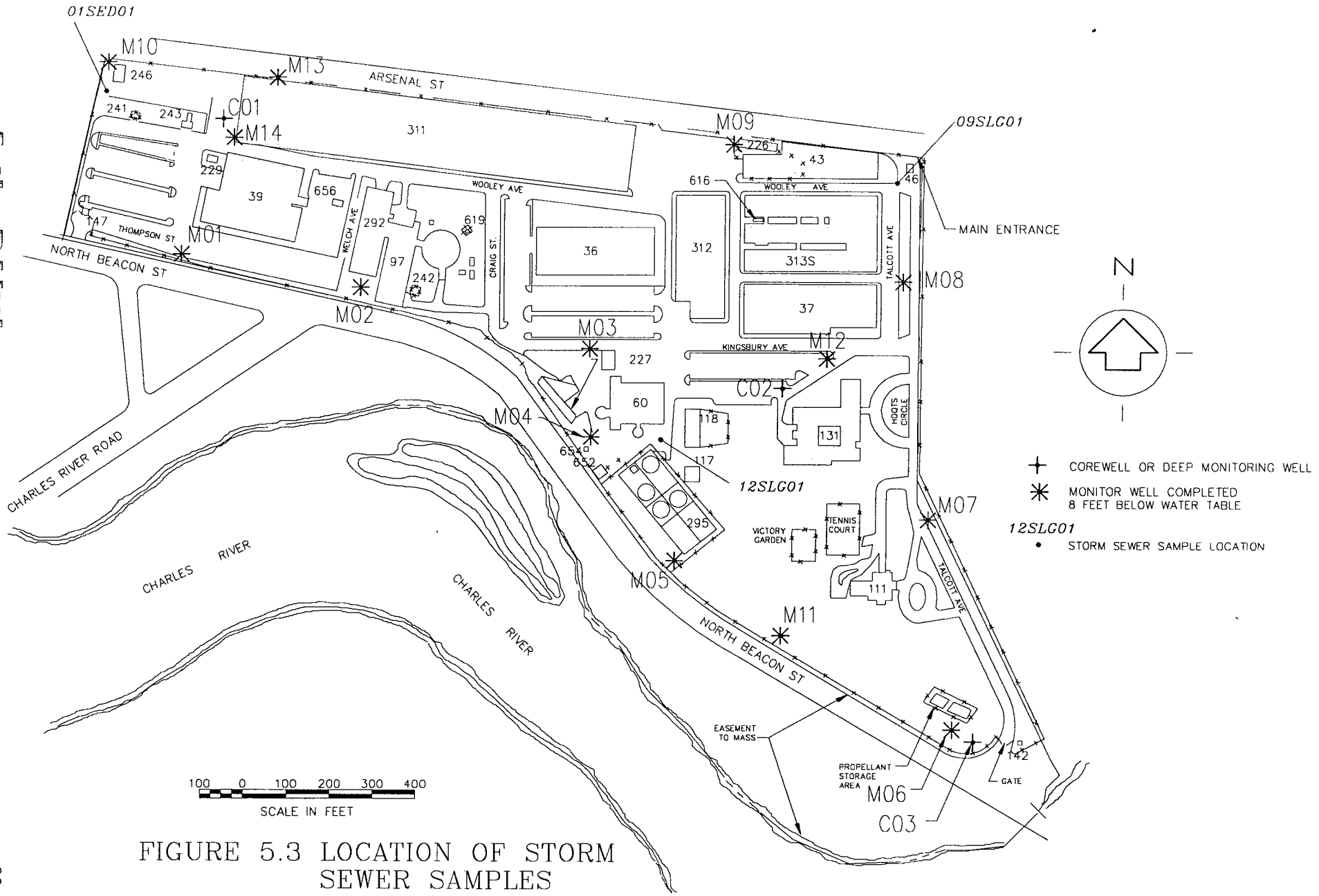


FIGURE 5.3 LOCATION OF STORM SEWER SAMPLES

Source: Arthur D. Little, 1988

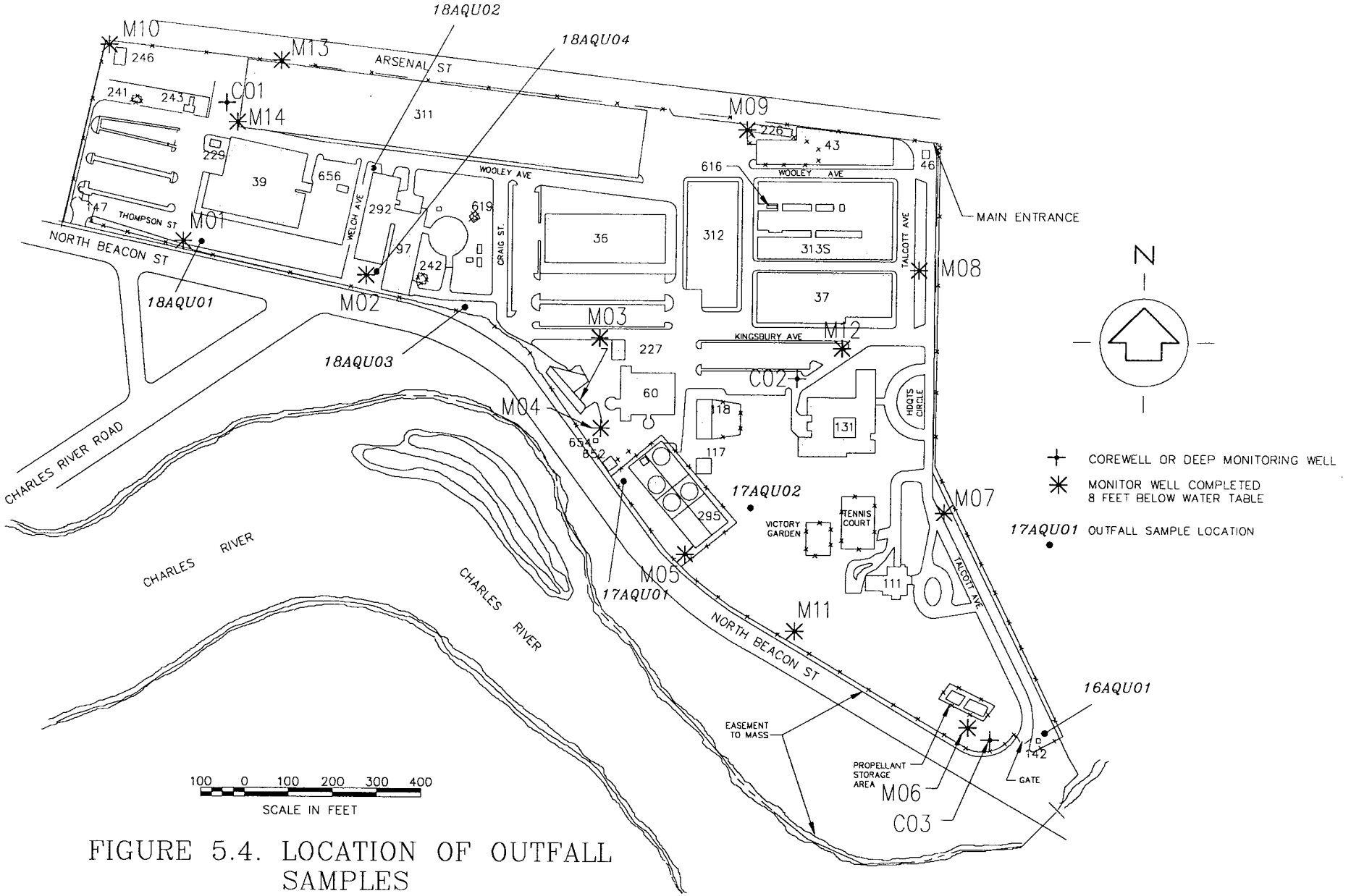


FIGURE 5.4. LOCATION OF OUTFALL SAMPLES

Source: Arthur D. Little, 1988

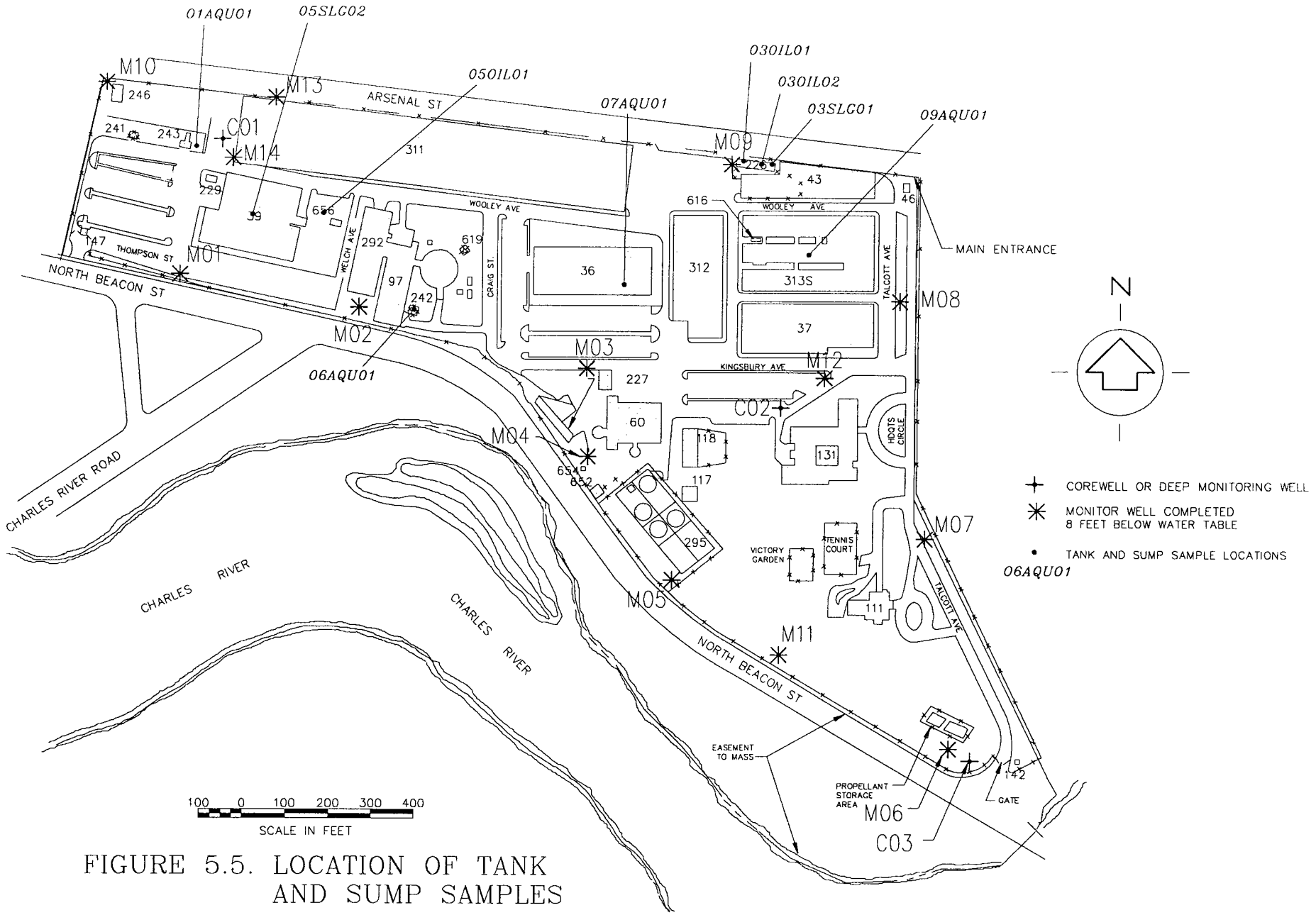


FIGURE 5.5. LOCATION OF TANK AND SUMP SAMPLES

Source: Arthur D. Little, 1988

5.1.1 Methods

All wells were opened in the presence of the site health and safety officer, and the head space monitored with an HNu P-101 photoionization detector for the presence of volatile organic compounds. Readings are recorded on the water level sheets. Only well CO-2 registered above background, at approximately 200 ppm. The site health and safety officer declared that well CO-2 would be sampled with level C protection. Water levels were then measured using a Solinst electric water level probe. All wells were opened, monitored and measured (water levels) on March 8.

Wells were purged by removing 5 well and annular space (assuming 30% porosity) volumes, using a decontaminated submersible pump. Water was observed for suspended solids, temperature, pH and conductivity stabilization. Meters were calibrated according to the frequencies specified in Table 5.2. Purging was completed when the desired volume of water was removed or the well pumped dry. Well MW-03 was purged with a stainless steel bailer until it went dry. Purge water was containerized in DOT-approved 55 gallon drums and labeled with date, well number,and number of drum on both the drum and the lid.

All wells were sampled using a Teflon or stainless steel bailer which was decontaminated between wells. Samples were immediately collected for volatile organic compounds by gently pouring well water into two 40 ml, amber glass bottles with Teflon septa caps. The bottle was sealed and checked to insure that no air bubbles were trapped in the bottle. Subsequent samples were collected for semivolatile organic compounds, cyanide, pesticides/PCBs, sulfide, and metals. Sample containers used for each sample are listed in Table 5.3. Water samples taken for metals were poured into a dedicated, clean glass bottle (previously rinsed with water from the well), and filtered utilizing clean Teflon tubing, a peristaltic pump and a 45 micron SamplePro filter. Samples were preserved according to the procedures listed in Table 5.4, labeled and placed in coolers with ice. A chain-of-custody was filled out, the cooler was monitored for radioactivity using a Geiger Muller meter (all samples passed the screening), and then the cooler was sealed. At the end of each day the coolers were transported by the field crew to the Arthur D. Little analytical laboratory in Cambridge.

Sample labels were filled out and preservatives added to the sample containers in a field office set up by Arthur D. Little at the MTL. During purging, the well waters were tested for free chlorine, using potassium iodide test paper, for sulfide using lead acetate paper, pH, conductivity, and temperature. The presence of either chloride or sulfide require a different procedure for sample perservation. No chloride or sulfide were detected in any of the ground water samples collected. so routine preservation procedures were used.

Duplicate samples were collected for wells CO-2 and MW-04 on the day following the first sample. After the collection of the duplicate samples, equipment blanks

Table 5.3: Sample Container, Preservation and Holding Time

Analytes	Matrix	Bottle Size	Preservation	Holding Time
TCL+30 Volatile Organics	Soil	40mL VOA (3)	Cool <4°C	14 days
TCL+30 Semi Volatile Organics	Soil	1 x 1L Amber	Cool <4°C	7 Days (extraction) 40 Days (to analysis)
PCBs	Soil	1 x 1L Amber	Cool <4°C	7 Days
Cyanide	Soil	1 x 250 mL Amber	Cool <4°C	14 Days
Metals/TCL Metals	Soil	1 x 500 mLAmber	Cool <4°C	28 Days
TCL+30 Volatile Organics	Water	40 mL VOA (3)	HCL pH <2 $Na_2S_2O_3$ if free C1 Cool <4°C	14 Days
TCL+30 Semi Volatile Organics	Water	1 x 1 gal Amber	$Na_2S_2O_3$ if free C1 Cool <4°C	7 Days
Cyanide	Water	1 x 1 L Polyeth	Cool <4°C Test for sulfide with lead acetate paper, Codmium Nitrate if present NaOH pH<12 0.6 gm Ascorbid Acid if free C1	14 Days
Sulfide	Water	1 x 1 L Polyeth	2mL/L 2N ZnAcetate NaOH pH >9 Cool <4°C	7 Days
Metals/TCL Metals	Water	1 x 1 Polyeth	HNO_3 pH<2	28 Days

Table 5.4: Water Sample Preservation

Volatiles -	Test for presence of free chlorine using potassium iodide test paper. If present add sodium thiosulfate at level of 0.008% per Liter (1 drop 1N/40mL). Adjust pH of solution to pH <2 with HCL (4 - 6 drops conc HCL/40mL).
Semi-volatile -	Test for presence of free chlorine using potassium iodide test paper. If present, add sodium thiosulfate at level of 0.008% per Liter (2mL/Gal).
Cyanide -	Test for presence of sulfide with lead acetate paper. If present, add cadmium nitrate until sulfide no longer detected. Test for presence of free chlorine with potassium iodide paper. If present, add ascorbic acid at rate of 0.6 gm per Liter. Add Sodium Hydroxide to pH > 12 (2-5 mL/Liter).
Sulfide -	Add 2 mL/Liter of 2N Zinc Acetate solution. Add NaOH to pH>9 (2-4 mL/Liter)
Metals -	Add HNO_3 to pH<2 (2-5 mL/Liter)

(2) were taken by decontaminating the bailer and then capturing distilled, deionized water passed through the bailer.

The bailers were decontaminated between each well by triple rinsing in distilled, deionized water. The clean bailers were wrapped in aluminum foil to prevent contamination during transport and handling between wells. PVC gloves were used to handle all clean equipment. Dedicated bailer twine was used for each well. Rinse water was collected and drummed in the same manner as the purge water.

5.1.2 Modifications

The only modifications to the original work plan were the use of a stainless steel bailer in addition to the Teflon bailer and the need for level C protection in the collection of the sample and duplicate for well CO-2.

5.2 Soil Samples

Twenty-two shallow soil samples were taken from locations specified by EG&G, approved by USATHAMA and staked by the Arthur D. Little Project Manager. Two of the 22 samples were duplicates. These sample locations correspond to original soil sampling locations.

5.2.1 Methods

All soil samples were collected using a decontaminated 3-inch stainless steel bucket-type hand auger. An area approximately 6 inches in diameter was cut in the sod using a decontaminated stainless steel trowel to remove the sod and root zone from the sample area. Surface soil samples were taken at a depth from approximately 1 to 6 inches depth; subsurface samples were taken at approximately 6 to 18 inches depth. To obtain the desired volume, several holes were made adjacent to one another. The sample for volatile organic compounds was taken immediately by rapidly filling 2 40ml amber, glass bottles as full as possible to eliminate head space, and capped with a Teflon septa seal. Subsequent samples were taken for semivolatile organic compounds, pesticides/PCBs, metals, cyanide, and sulfide. Five samples, taken adjacent to transformers, were taken only for PCBs (03SOL01, 06SOL01, 09SOL01, 09SOL02, and 13SOL01). Sample containers used are listed in Table 5.3. Sample containers were labeled, placed in a cooler with ice, a chain-of-custody was filled out, the cooler was monitored for radioactivity with a Geiger Muller meter (all samples passed the screening), and then sealed. At the end of each day, the field crew transported the cooler to the Arthur D. Little analytical laboratory in Cambridge.

Duplicate samples were collected at 01SOL01 and 06SUB01.

The soil auger and trowel were decontaminated by first scrubbing the equipment with a nylon-bristle brush to remove soil and debris adhering to the equipment.

They were next scrubbed with MTL tap water and a nylon-bristle brush, and finally triple rinsed in distilled, deionized water. Decontaminated equipment was wrapped in aluminum foil to prevent contamination during transport and handling between sites. All clean equipment was handled with latex rubber or PVC gloves.

5.2.2 Modifications

The only modification to the original work plan involved the taking of the equipment blanks. Normally these are taken after a piece of sampling equipment is decontaminated after the last event of the day or after a site suspected to be contaminated is sampled. We specified taking the equipment blank after the duplicate samples. This was inadvertently omitted by the field crew. To correct this omission, each duplicate sample site (01SOL01 and 06SUB01) was resampled, the sample discarded, the hand auger decontaminated according the specified procedure, and an equipment blank taken by passing distilled, deionized water through the auger bucket, and collecting it in the proper sample containers. A memorandum documenting this event is included with the chain-of-custody record.

5.3 Storm Sewer Sediment Samples

Three storm sewer sediment samples were collected from storm sewer catch basins at locations specified by EG&G and approved by USATHAMA. These sample locations correspond to original sampling locations.

5.3.1 Methods

Prior to removing the storm sewer grate, the catch basin was monitored for radioactivity with a Geiger Muller meter and for volatile organic compounds with an HNu P-101 photoionization detector. All catch basins were approved for sampling. The grate was then removed and a sediment sample taken. Samples were taken using a decontaminated Pyrex glass beaker attached with a stainless steel clamp to a wood extension pole. Sample containers used were the same as that specified for soil samples in Table 5.3.

The first sample taken was for volatile organic compounds; subsequent samples were taken for semivolatile organic compounds, pesticides/PCBs, cyanide, and sulfide. Samples were labeled, placed in a cooler with ice, a chain-of-custody completed, monitored for radioactivity with a Geiger Muller meter (all samples passed the screening), and then sealed. At the end of the day the sample cooler was transported to the Arthur D. Little analytical laboratory by the field crew.

No duplicate samples were taken as none were required in the scope of work.

Decontamination of the Pyrex beaker used for sampling was performed using the procedure described previously for the soil sampling equipment.

5.4 Outfall 24-Hour Composite Samples

Seven outfalls were sampled by collecting a 24-hour composite sample at each outfall location. The outfalls were all on the MTL property at locations designated by EG&G, and approved by USATHAMA. These samples correspond to original sample locations.

5.4.1 Methods

To guarantee the security of the samples, they were taken manually rather than with an automatic sampler. The 24-hour composite was developed by taking a subsample at 4 hour intervals on February 22 and 23, at 2130 hr., 0130 hr., 0530 hr., 0930 hr., 1330 hr., and 1730 hr. Using a decontaminated stainless steel dipper, 1.5 liters was obtained of the discharge flowing from the pipe and placed into a clean 10 liter glass compositing jar, one for each outfall. As there was no flow in the outfall for sample 17AQU01, standing fluid was sampled from the sump. Samples for volatile organic compounds were taken as a single sample during the initial February 22 2130 hour event. Samples for semivolatile organic compounds, pesticides/PCBs, metals, cyanide and sulfide were taken as aliquots from the 10 liter compositing jar at the end of the 24-hour event. Samples were placed in containers and preserved according to the specifications in Tables 5.3 and 5.4 for water samples. Metals were not filtered, however, since it was felt that particulate transport of adsorbed metals was a significant transport mechanism for the discharge. Samples were labeled, placed into a cooler with ice, a chain-of-custody completed, the cooler was monitored for radioactivity using a Geiger Muller meter (all samples passed the screening) and the cooler then sealed. At the end of the 24-hour sampling event, the coolers were transported to the Arthur D. Little laboratory in Cambridge.

No duplicate samples were taken, as none were required in the scope of work.

The stainless steel dipper was decontaminated between outfalls by triple rinsing in distilled deionized water.

5.4.2 Modifications

In the work plan we had specified taking the subsamples from the outfall with a Pyrex glass beaker, but due to equipment availability were able to use a stainless steel dipper designed for such sampling. We had also suggested in the original sampling plan that 2 samples be taken for volatile organic compounds, one during the night and one during the day to capture diurnal variations in the discharge that might be due to variation in the operations at MTL over the 24 day. At the direction of EG&G, only one sample for volatile organic compounds was taken from each outfall.

5.5 Tank and Sump Samples

Eight samples were taken from tanks and sumps; 3 sludge samples, 2 aqueous samples and 3 oil samples.

5.5.1 Methods

Prior to sampling, all tanks or sumps were monitored with an HNu P-101 photoionization detector. The three sludge samples (05SLG02, 03SLG01, and 07AQU01 - no fluid in sump so a sludge sample was taken) were collected using a decontaminated Pyrex glass beaker and filling the appropriate sample container listed in Table 5.3 for soils. Samples for volatile organic compounds were taken first.

The two aqueous samples (01AQU01 and 09AQU01) were taken with a decontaminated bailer. Aqueous samples were placed in the appropriate sample containers as listed for water in Table 5.3, and preserved according to the specifications of Table 5.4.

The 3 samples of oil were obtained with a dedicated, decontaminated Teflon bailer, accessing the tanks through the vent stacks. Portions of the piping were removed by MTL staff to facilitate the sampling. Samples for volatile organic compounds were taken first using 2 40 ml amber, glass bottles with Teflon septa screw caps. Care was taken to make sure that no air remained in the sample bottle. An additional 500ml amber, glass bottle was filled for the remaining analytical requirements: semivolatile organic compounds, pesticides/PCBs, metals, cyanide, and sulfide.

5.5.2 Modifications

A sample originally designated for a storm sewer clean-out under Building 39 (05SLG01) was not taken at the direction of EG&G, since there was no flow or sludge. A sample from a sump in the basement of Building 36 (07AQU01) which was originally designated as an aqueous sample was taken as a sludge sample, at the direction of EG&G, since there was no liquid in the sump. While our work plan assumed all sampling would be at level D, and excluded confined space entry work, a sludge sample taken from the tank vault (03SLG01) was taken under the supervision of the site health and safety officer, with the sampler wearing an SCBA. Entry was made after the tank vault had been suitably ventilated, using Arthur D. Little's procedures for confined space entry.

5.6 Water Sample from the Reactor Emergency Coolant Tank

Two water samples were taken from the reactor emergency coolant tank.

5.6.1 Methods

Two water samples were taken from the emergency reactor coolant tank by the site health and safety officer, who is also Arthur D. Little's Radiation Safety Officer. Before the sample was taken, the tank was monitored with a Geiger Muller detector for radioactivity; no abnormal readings were detected. The samples were taken by immersing a 1 gallon, amber glass sample bottle in the tank. Access to the tank was gained through a trap door. The samples were preserved by adjusting the pH to less than 2.0 with nitric acid. The samples were labeled, screened for radioactivity with a Geiger Muller meter, placed in a cooler with ice, a chain-of-custody completed and the cooler sealed. The cooler was transported to the Arthur D. Little analytical laboratory in Cambridge by the field crew.

5.6.2 Modifications

Two samples were taken from the cistern. One was included in the original scope of work and one sample was not included. The sample called for in the sampling plan was taken and analyzed for non-radiological contamination. The additional sample was taken by Arthur D. Little personnel, then shipped to EG&G Idaho for radiological analysis.

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Arthur D Little

Ground Water Monitoring Report

Well No. C-02
Client E G+G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mont
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0530
Background 0.5 ppm
Electric water level meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
1120 5-05-90	1120	200	37.49	30' 11 7/8"	.6.5		HNu reading in well @ 1' = 200ppm Well opening 5-10ppm → Breathing Zone 0.5ppm	RNL
				30.99			Modified Level D for well purging is necessary. Level C will be implemented if deemed necessary	CBM
							Purging to begin.	

Arthur D Little

Ground Water Monitoring Report

Well No. 103
Client E&E
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mount
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated to 8.30
Background 0.0 ppm
Electric Dam Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-03-90	1312	0.6	11.90	8' 1½"	3.78			CBM
				8.125				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-01
Client E G+G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ well mount
Elevation

Measuring and Sampling Equipment Used

HNu P.I.D Calibrated at 1030
Background 0.5 ppm
Electric water level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
1-8-90	1030	0.5	24.98	6' 8½"	18.27			RNL
				6.71				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-02
Client EG+G
Project
Case No. 61453

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mant
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0930
Background 0.6ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-8-90	1038	0.6	24.04	9'3"	14.79			RHL
				9.25				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-03
Client EG&G
Project
Case No. 61453

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ well mount
Elevation

Measuring and Sampling Equipment Used

H_2 PID Calibrated at OS 30
Background 0 5 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-05-90	1058	0.5	36.63	22'4"	14.30			RNL
				22.33				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-04
Client EG&G
Project
Case No. 61453

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mant
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0830
Background 0.6 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-08-90	1054	0.6	36 52	28' 3"				RNL
				28.25				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-05
Client EG&G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ well mount
Elevation

Measuring and Sampling Equipment Used

[illegible] pump / [illegible]
[illegible]
[illegible] water level

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-08-90	1345	0.0	15.93	9' 3 7/8"	6.61			KNL
				9.32				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-06
Client L6+G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mount
Elevation

Measuring and Sampling Equipment Used

[illegible]

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
[illegible]	1376	0.6	11.96	7'5¼	4.52			
				7.44				CBM

Arthur D Little

Ground Water Monitoring Report

Well No. MW-07
Client E616
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description flush w/ well mount
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0530
Background 0.6ppm
Electric water level meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
05-90	1302	0.6	34.84	29' 10½"	4.97			RNL
				29.88				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-08
Client E&G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ well mount
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0530
Background 0.6 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-05-90	1146	0.6	39.48	33' 1¾"				RNL
				33 15				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-05
Client E6+6
Project
Case No. 6453

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mnt
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0.0
Background 0.6 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
9-08-90	1154	0.6	37.03	12' 6 3/4"	24.50			RNL
				12.53				

Arthur D Little

Ground Water Monitoring Report

Well No. MW-10
Client EG+G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well Mount
Elevation

Measuring and Sampling Equipment Used

HNu PID - Calibrated @ 30
Electronic ~~well~~ Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-8-90	0953	0.6	Flush w/ well mount	9 5/8"				RNL
			32.86	9.05	23.81			

Arthur D Little

Ground Water Monitoring Report

Well No. MW-11
Client E&C
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ curb mark
Elevation

Measuring and Sampling Equipment Used

HNu PID with [illegible]
Background 0.6 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
12-18-90	1333	0.6		4'7½"				MHL
			11:01	4.77	6.24			

Arthur D Little

Ground Water Monitoring Report

Well No. MW-12
Client EG&G
Project
Case No. 61453

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/well mount
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0530
Background 0.5 ppm
Electric Water Level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-05-90	1131	0.5		32'2 3/4"				RNL
			38 52	32 23	6.29			

Arthur D Little

Ground Water Monitoring Report

Well No. MW-13
Client EG&G
Project
Case No.

ate Installed

Date Developed

LOCATION

Measuring Point

esc iption Flush w/ well mount
levation

Measuring and Sampling Equipment Used

HNu PID - Calibrated at 0.52
Background - 0.4ppm
Electronic water level meter

ate	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
08 10	1008	0.4		12' 3½"				RNK
			35.30	12.30	23.00			

Arthur D Little

Ground Water Monitoring Report

Well No. MW-14
Client EG&G
Project
Case No.

Date Installed

Date Developed

LOCATION

Measuring Point

Description Flush w/ well mast
Elevation

Measuring and Sampling Equipment Used

HNu PID Calibrated at 0.3%
Background 0.6ppm
Electric water level Meter

Date	Time	Total Organics (ppm)	Measuring Point	Depth To Water	Water Surface Elevation	Total Well Depth	Remarks	Read By
2-8-90	1018	0.8		15'6½"				RNL
			35.49	15.54	19.95			

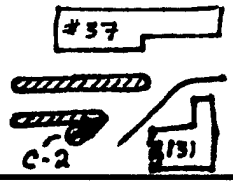
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. CO-2
Client EG+G/USAIHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-12-90
Sampling Method: BAILER (LEVEL C)	Equipment Used (Calibrated (Y)/N): HNu-PID, TEMP/COND. METER
Sampling Personnel: T. FORTNER, C. MARTEL, S. FOSTER	Initial Well PID (ppm): 188 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
.66	x [(	38.48	-	34.34	)]=	2.73

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	38.48	-	34.34	)]=	4.38

WATER TO BE REMOVED

	Gallons of Water (well)		Gallons of Water (annulus)		Removal Multiplier		Total Gallons to be Removed	Actual Gallons Removed
[(	2.73	+	4.39	)] x	5	=	35.6	35

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y)/N	Dissolved Oxygen
1608	6.49	0.42	15°C	No	-
1616	6.5	0.33	15.6°C	No	-
1625	6.4	0.34	14.4°C	No	-
1632	5.5	0.32	15.0°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE
Solvent Used _____

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
CO-2	TCL+30 VOL.	40	No	HCL pH<2, ICE	AMBER GLASS (3)	1705
CO-2	TCL+30 SEMI	1 GALLON	No	ICE,	" " (1)	1705
CO-2	CYANIDE	1L	No	ICE, NaOH pH>12	POLYETHYLENE	1705
CO-2	SULFIDE	1L	No	ICE, NaOH pH>9	" "	1705
CO-2	METALS	1L	YES	ICE, HNO_3 pH<2	" "	
						1705
				+ ZN ACETATE		

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

SAMPLED WELL IN LEVEL C DUE TO 5-20 ppm READING IN BREATHING ZONE. EXCLUSION ZONE WAS DEFINED. THIS WELL WILL BE DUPLICATE SAMPLED TOMORROW AFTER SITTING FOR 24 HOURS.

Sigature _____ Date 2-12-90 No. of Bottles 7

Arthur D Little

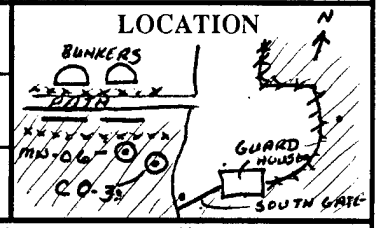
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. CO-3
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-14-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)N): HNO-PID, TEMP/COND. METER
Sampling Personnel: T. FORTNER, C. MARIEL	Initial Well PID (ppm): 0.6ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well: .66 x [(Depth Screen Bottom: 33.07 - Depth Water: 7.73)] = Gallons of Water (well): 16.7

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus: 1.06 x [(Depth Screen Bottom: 33.07 - Depth Bottom of Seal: 7.73)] = Gallons of Water (annulus): 26.9

WATER TO BE REMOVED

[(Gallons of Water (well): 16.7 + Gallons of Water (annulus): 26.9)] x Removal Multipier: 5 = Total Gallons to be Removed: 218

Actual Gallons Removed: 220

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y)N	Dissolved Oxygen
1007	6.69	0.65	12.5°C	No	-
1030	6.59	0.85	13.0°C	No	-
1058	6.56	0.87	13.0°C	No	-
1127	6.53	0.88	12.9°C	No	-
1255	6.60	0.86	12.9°C	No	-
1322	6.70	0.70	13.1°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used ____

☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
CO-3	TCL+30 VOLA.	40 ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1444
CO-3	TCL+30 SEMI.	1 GALLON	No	ICE,	" " (1)	1444
CO-3	CYANIDE	1L	No	ICE, NaOH pH>12	POLYETHYLENE	1444
CO-3	SULFIDE	1L	No	ICE, NaOH pH>9, + ZN ACETATE	" "	1444
CO-3	METALS	1L	YES	ICE, HNO_3 pH<2	" "	1444

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
FILLED 3 DRUMS, HAD TO STOP PUMPING 'TIL ADDITIONAL DRUMS ARRIVED. STOPPED PUMPING 1127, RESUMED PUMPING 1255, COMPLETED PUMPING 1322.

Sigature _____ Date 2-14-90 No. of Bottles 7

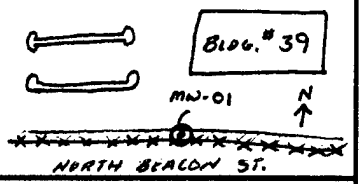
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-01
Client E&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-8-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y/N)): HNu-PID, COND. METER, pH PAP, THERM.
Sampling Personnel: J. FORTNER, P. CONN	Initial Well PID (ppm): 0.5 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
.66	x [(	16.2	-	5.77	)]=	6.9

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	16.2	-	5.77	)]=	11.05

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(6.9	+	11.05	)] x	5	=	89.75	90-95

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
1455	6.0	1.89	11.0°C	No	-
1520	6.0	2.40	10.0°C	No	-
1530	6.0	2.38	10.0°C	No	-
1546	6.0	2.31	10.0°C	No	-
1603	6.0	2.28	10.0°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE
Solvent Used ———

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-01	TCL+30 VOL.	40 ml	No	ICE, HCL PH<2	AMBER GLASS (3)	1135
MW-01	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1135
MW-01	CYANIDE	1L	No	ICE, NaOH pH>12	POLYETHYLENE	1135
MW-01	SULFIDE	1L	No	ICE, NaOH pH>9 + ZN ACETATE	" "	1135
MW-01	METALS	1L	YES	ICE, HNO_3 pH<2	" "	1135

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
WATER IS CLEAR

Sigature [signature] Date 2/9/90 No. of Bottles 7

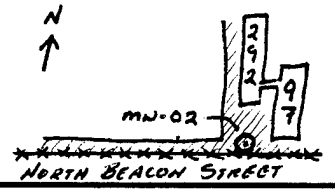
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-02
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-8-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)/N): HNu-PID, pH PAPER, THERMOM, COND. METER
Sampling Personnel: T. FORTNER, P. CONN	Initial Well PID (ppm): 0.0ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
.66	x [(	16.42	-	8.84	)]=	5

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	16.42	-	8.84	)]=	8.02

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(5	+	8	)] x	5	=	65	≈65

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
1200	6.5	1.32	12.0°C	No	-
1220	6.0	1.54	12.0°C	No	-
1240	6.0	1.6	13.0°C	No	-
1325	6.0	1.5	13.0°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used ____
☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-02	TCL+30 VOL.	40 ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1233
MW-02	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1233
MW-02	CYANIDE	1 l	No	ICE, NaOH pH>12	POLYETHYLENE	1233
MW-02	SULFIDE	1 l	No	ICE, NaOH pH>9 + 2% ZN ACETATE	" "	1233
MW-02	METALS	1 l	YES	ICE, HNO_3 pH<2	" "	1233

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
THE WATER IS CLEAR

Sigature [signature] Date 2/8/90 No. of Bottles 7

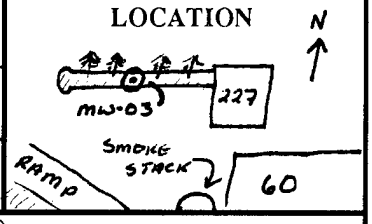
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-03
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: BAILER	Date: 2-12-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)/N): HNU-PID, pH/COND. METER
Sampling Personnel: J. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.5 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
.66	x [(	25.05	-	21.88	)]=	2

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	25.05	-	21.88	)]=	3.3

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(2	+	3.3	)] x	5	=	26.5	18

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
1053	6.99	2.18	17.8°C	No	-
1107	6.64	2.52	18.9°C	No	-
1144	6.58	2.69	17.9°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used ____

☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O Rinse

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-03	TCL+30 VOL.	40 ml	No	ICE, HCl, pH<2	AMBER GLASS (3)	1823
MW-03	TCL+30 SEMI.	1 GALLON	No	ICE	" " (1)	1823
MW-03	CYANIDE	1 l	No	ICE, NaOH, pH>12	POLYETHYLENE	1823
MW-03	SULFIDE	1 l	No	ICE, NaOH, pH>9 + ZN ACETATE	" "	1823
MW-03	METALS	1 l	YES	ICE, HNO_3, pH<2	" "	1823

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

DUE TO REQUIRED LOW VOLUME/THE FACT THAT THIS WELL HAS A HISTORY OF GOING DRY/AND TO SAVE TIME, THIS WELL WAS PURGED VIA A BAILER WHILE PUMP WAS USED TO PURGE MW-04. WHILE BAILING, GLOVES BECAME STICKY, AND BAILER SMELLED OF CEDAR SAP. WELL WENT DRY AFTER PURGING ± 18 GALLONS

Sigature _____ Date 2-12-90 No. of Bottles 7

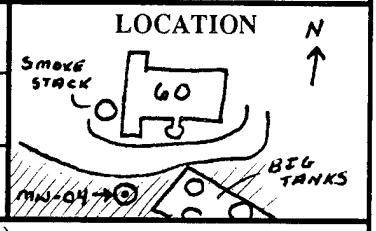
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-04
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-12-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)/N): HNU-PID, pH/TEMP/COND. METERS
Sampling Personnel: T. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.6 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
.66	x [(	34.02	-	28.05	)]=	4

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	34.02	-	28.05	)]=	6.3

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(4	+	6.3	)] x	5	=	51.5	55

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y)/N	Dissolved Oxygen
1038	6.87	0.27	19.2°C	No	-
1048	7.11	0.21	24.7°C	No	-
1103	7.30	0.20	25.0°C	No	-
1114	7.32	0.21	24.9°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used _____
☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-04	TCL+30 VOL	40ml	No	ICE, HCl, pH<2	AMBER GLASS (3)	1802
MW-04	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1802
MW-04	CYANIDE	1 l	No	ICE, NaOH, pH>12	POLYETHYLENE	1802
MW-04	SULFIDE	1 l	No	ICE, NaOH, pH>9 + ZnACETATE	" "	1802
MW-04	METALS	1 l	YES	ICE, HNO_3, pH<2	" "	1802

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
PURGED MW-03 W/ BAILER SIMULTANEOUSLY. THIS WELL WILL BE DUPLICATE SAMPLED TOMORROW AFTER STANDING FOR 24 HOURS.

Sigature _____ Date 2-12-90 No. of Bottles 7

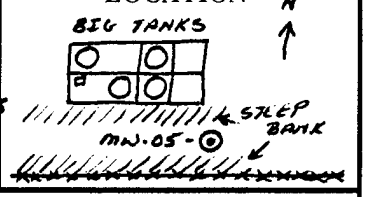
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-05
Client E&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-13-90
Sampling Method: BAILER	Equipment Used (Calibrated Y/N): HNu-PID, pH/TEMP/COND. METER
Sampling Personnel: J. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.6 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	18.39	-	8.63	)]=	6.4

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	18.39	-	8.63	)]=	10.3

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(6.4	+	10.3	)] x	5	=	83.5	20

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
1200	5.24	0.18	9.8°C	No	-
1223	WELL RAN DRY, ALLOWED RECHARGE				-
1240	5.58	0.39	8.9°C	No	-
1244	WELL RAN DRY, END PUMPING				-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used _____
☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O Rinse

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-05	TCL+30 VOL	40ml	No	ICE, HCl, pH<2	AMBER GLASS (3)	1735
MW-05	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1735
MW-05	CYANID	1L	No	ICE, NaOH, pH>12	POLYETHYLENE	1735
MW-05	SULFIDE	1L	No	ICE, NaOH, pH>9 + ZN ACETATE	" "	1735
MW-05	METALS	1L	Yes	ICE, HNO_3, pH<2	" "	1735

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
WATER APPEARED EXTREMELY RUSTY, WELL WAS PUMPED DRY TWICE

Sigature _____ Date 2-13-90 No. of Bottles 7

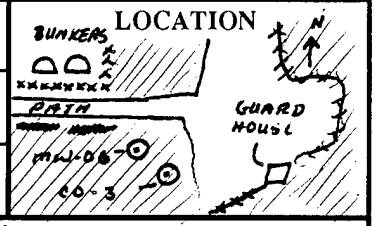
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-06
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-14-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)/N): HNu-PID, pH/TEMP/COND. METERS
Sampling Personnel: J. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.6ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	15.17	-	6.87	)]=	5.5

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	15.17	-	6.87	)]=	8.8

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(5.5	+	8.8	)] x	5	=	71.5	75

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y)/N	Dissolved Oxygen
1334	5.94	2.17	10.9°C	No	-
1357	5.26	2.48	11.8°C	No	-
1420	5.47	2.45	11.1°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annulus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE
Solvent Used _____

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-06	TCL+30 VOL.	40ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1454
MW-06	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1454
MW-06	CYANIDE	1l	No	ICE, NaOH pH>12	POLYETHYLENE	1454
MW-06	SULFIDE	1l	No	ICE, NaOH pH>9 + ZN ACETATE	" "	1454
MW-06	METALS	1l	YES	ICE, HNO_3 pH<2	" "	1454

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
GOOD FLOW

Sigature _____ Date 2/14/90 No. of Bottles 7

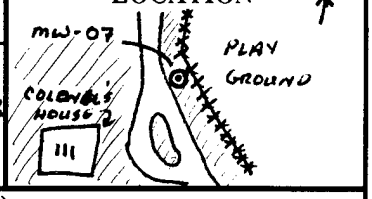
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-07
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-9-90
Sampling Method: BAILER	Equipment Used (Calibrated Y/N): HNu-PID, pH PAPER, COND. METER, THERM.
Sampling Personnel: J. FORTNER, P. CONN	Initial Well PID (ppm): 0.6 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	36.87	-	29.17	)]=	5.08

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	36.87	-	29.17	)]=	8.16

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(5.08	+	8.16	)] x	5	=	66.22	70

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
1540	6	0.22	15° C	No	-
1545	6	0.24	15° C	No	-
1555	6	0.30	15° C	No	-
1615	7	0.30	15° C	No	-
				No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE
Solvent Used _____

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-07	TCL+30 VOL	40 ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1700
MW-07	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1700
MW-07	CYANIDE	1 l	No	ICE, NaOH pH>12	POLYETHYLENE	1700
MW-07	SULFIDE	1 l	No	ICE, NaOH pH>9 + ZnACETATE	" "	1700
MW-07	METALS	1 l	YES	ICE, HNO_3 pH<2	" "	1700

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

Sigature _____ Date 2-9-90 No. of Bottles 7

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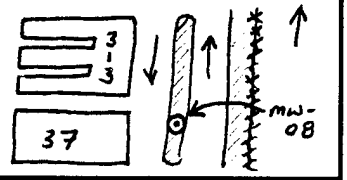
Monitoring Well Sampling Data Sheet

Well No. MW-08
Client EG&G / USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-12-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)/N): HNu-PID, pH/COND/TEMP METERS
Sampling Personnel: J. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.6ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	40.03	-	32.51	)]=	5

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	40.03	-	32.51	)]=	8

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier	Total Gallons to be Removed	Actual Gallons Removed
[(5	+	8	)] x	5	= 65	65

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL^- (Y/N)	Dissolved Oxygen
0909	6.77	0.77	13.6°C	No	-
0916	6.44	0.27	14.6°C	No	-
0930	6.51	0.42	13.3°C	No	-
0937	6.43	0.85	13.6°C	No	-
					-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used _____
☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-08	TCL+30 VOA	40ml	No	Ice, HCl pH<2	AMBER GLASS (3)	1920
MW-08	TCL+30 SEMI	1 GALLON	No	Ice	AMBER GLASS (1)	1920
MW-08	CYANIDE	1l	No	Ice, NaOH pH>12	POLYETHYLENE	1920
MW-08	SULFIDE	1l	No	Ice, NaOH, pH>9 + ZnAcetate	" "	1920
MW-08	METALS	1l	YES	Ice, HNO_3 pH<2	" "	1920

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

Sigature _____ Date 2/12/90 No. of Bottles 7

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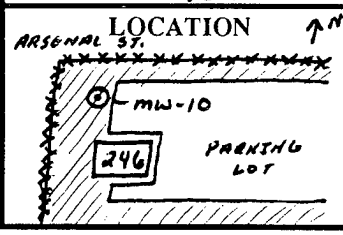
Monitoring Well Sampling Data Sheet

Well No. MW-10
Client E616/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)
Date: 2-8-90
Sampling Method: BAILER
Equipment Used (Calibrated Ⓨ/N): HNu-PID, pH meter/Conductivity, THERM.
Sampling Personnel: A. FORTNER, P. CONN
Initial Well PID (ppm): 0.6 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	17.12	-	11.69	)]=	3.58

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	17.12	-	11.69	)]=	5.75

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(3.58	+	5.75	)] x	5	=	46.7	≈ 25

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL⁻ Ⓨ/N	Dissolved Oxygen
1725	6	0.40	11	No	-
1733	6	0.65	13	No	-
1800	6	0.52	13	No	-
1830	6	0.49	13	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE
Solvent Used ———

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-10	TCL+30 VOL	40ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1100
MW-10	TCL+30 SEMI'S	1 GALLON	No	ICE	" " (1)	1100
MW-10	CYANIDE	1l	No	ICE, NaOH pH>12	POLYETHYLENE	1100
MW-10	SULFIDE	1l	No	ICE, NaOH pH>9	" "	1100
		##		+ZN ACETATE		
MW-10	METALS	1l	YES	ICE, HNO_3 pH<2	" "	1100

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
WATER IS RUSTY. WATER BEGAN CLEARING. 1733 WELL RAN DRY, ALLOWED RECOVERY, BEGAN PURGING AGAIN @ 1800, RAN DRY @ 1839.

Sigature _____ Date 2-8-90 No. of Bottles 7

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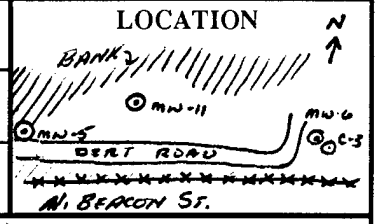
Monitoring Well Sampling Data Sheet

Well No. MW-11
Client E616/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: Pump (Submersible)	Date: 2-13-90
Sampling Method: Bailer	Equipment Used (Calibrated Y/N): HNu-PID, pH/Cond./Temp. Meter
Sampling Personnel: T. Fortner, C. Martel	Initial Well PID (ppm): 0.6ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	14.86	-	4.29	)]=	7.0

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	14.86	-	4.29	)]=	11.2

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(7.0	+	11.2	)] x	5	=	91.0	21

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL⁻ (Y/N)	Dissolved Oxygen
1530	5.41	1.05	9.9 °C	No	-
1612	5.45	0.40	12.6 °C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O Rinse
Solvent Used _____

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-11	TCL+30 VOA	40ml	No	Ice, HCl pH<2	Amber Glass (3)	1735
MW-11	TCL+30 Semi	1 Gallon	No	Ice	" " (1)	1735
MW-11	Cyanide	1l	No	Ice, NaOH, pH>12	Polyethylene	1735
MW-11	Sulfide	1l	No	Ice, NaOH, pH>9 + Zn Acetate	" "	1735
MW-11	Metals	1l	Yes	Ice, HNO_3, pH<2	" "	1735

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
@1615 well ran dry, ended purging.

Sigature Joseph J. Fortner Date 2-13-90 No. of Bottles 7

Arthur D Little

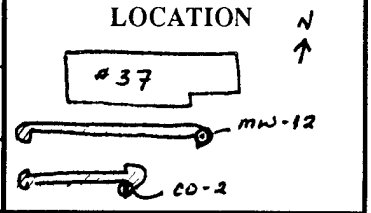
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-12
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-12-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)N): HNu-PID, pH/TEMP/COND. METERS
Sampling Personnel: J. FORTNER, C. MARTEL	Initial Well PID (ppm): 0.5ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	37.33	-	31.69	)]=	3.7

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	37.33	-	31.69	)]=	6

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(3.7	+	6	)] x	5	=	48.5	50

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL⁻ (Y)N	Dissolved Oxygen
1425	6.32	0.43	16.3°C	No	-
1433	6.07	0.33	16.8°C	No	-
1442	6.18	0.32	16.4°C	No	-
1455	6.25	0.32	10.6°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used ____

☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse

☐ Detergent Wash Water Rinse

☑ Other 3x D.I. H_2O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-12	TCL+30 VOL	40ml	No	ICE, HCl pH<2	AMBER GLASS (3)	2000
MW-12	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	2000
MW-12	CYANIDE	1l	No	ICE, NaOH pH>12	POLYETHYLENE	2000
MW-12	SULFIDE	1l	No	ICE, NaOH pH>9 + ZN ACETATE	" "	2000
MW-12	METALS	1l	YES	ICE, HNO_3 pH<2	" "	2000

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

Sigature [signature] Date 2-12-90 No. of Bottles 7

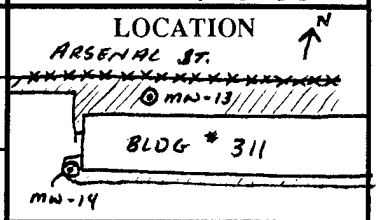
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-13
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: pump (submersible)	Date: 2-9-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)N): HNu-PID, pH paper, Cond. Met., Therm.
Sampling Personnel: J. FORTNER, P. CONN	Initial Well PID (ppm): 0.4ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	20.64	-	11.72	)]=	5.89

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	20.64	-	11.72	)]=	9.45

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multiplier		Total Gallons to be Removed	Actual Gallons Removed
[(5.89	+	9.45	)] x	5	=	77	80

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL⁻ (Y)N	Dissolved Oxygen
0845	5.5	0.28	12.5°C	No	-
0901	5.5	2.08	13.5°C	No	-
0910	6	3.12	14.0°C	No	-
0919	6.5	3.05	14.0°C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used
Solvent Used _____
☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse
☐ Detergent Wash Water Rinse
☑ Other 3x D.I. H_2O Rinse

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-13	TCL+30 VOL	40ml	No	ICE, HCl, pH<2	AMBER GLASS (3)	1120
MW-13	TCL+30 SEMI	1 GALLON	No	ICE	" " (1)	1120
MW-13	CYANIDE	1l	No	ICE, NaOH, pH>12	POLYETHYLENE	1120
MW-13	SULFIDE	1l	No	ICE, NaOH, pH>9 + ZnAcetate	" "	1120
MW-13	METALS	1l	YES	ICE, HNO_3, pH<2	" "	1120

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
WATER WAS INITIALLY CLOUDY BUT CLEARED UP DURING PURGING.

Sigature _____ Date 2-9-90 No. of Bottles 7

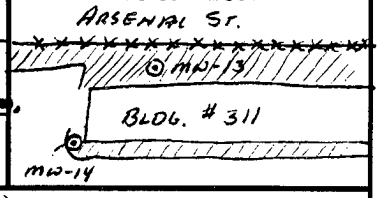
Arthur D Little

Monitoring Well Sampling Data Sheet

Well No. MW-14
Client EG&G / USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

Evacuation Method: PUMP (SUBMERSIBLE)	Date: 2-9-90
Sampling Method: BAILER	Equipment Used (Calibrated (Y)N): HNu-PID, pH PAPER, CONDUCT., THERM.
Sampling Personnel: J. FORTNER, P. CONN	Initial Well PID (ppm): 0.8 ppm

LOCATION



WELL VOLUME (* use appropriate values in table for each code letter)

V well		Depth Screen Bottom		Depth Water		Gallons of Water (well)
0.66	x [(	24.25	-	15.43	)]=	5.82

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus		Depth Screen Bottom		Depth Bottom of Seal		Gallons of Water (annulus)
1.06	x [(	24.25	-	15.43	)]=	9.35

WATER TO BE REMOVED

Gallons of Water (well)		Gallons of Water (annulus)		Removal Multipier		Total Gallons to be Removed	Actual Gallons Removed
[(5.82	+	9.35	)] x	5	=	70	80

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL⁻ (Y)N	Dissolved Oxygen
1040	6	0.58	15 °C	No	-
1059	6	0.67	17 °C	No	-
1203	6	0.62	19.5 °C	No	-
1345	6	0.64	21.0 °C	No	-

Post Sampling

Well	Annulus *	
V well	dia	V annalus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, WaterRinse ☐ Detergent Wash Water Rinse ☑ Other 3x D.I. H_2O RINSE

Solvent Used _____

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
MW-14	TCL+30 VOL.	40ml	No	ICE, HCl pH<2	AMBER GLASS (3)	1450
MW-14	TCL+30 SEMI	1 GALLON	No	ICE,	" " (1)	1450
MW-14	CYANIDE	1l	No	ICE, NaOH pH>12	POLYETHYLENE	1450
MW-14	SULFIDE	1l	No	ICE NaOH pH>9 + ZnAcetate	" "	1450
MW-14	METALS	1l	YES	ICE, HNO_3 pH<2	" "	1450

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)
WATER WAS CLOUDY BUT CLEARED DURING PURGING. WELL NEVER RAN DRY, BUT PUMPED V.V. SLOW. FINISH PURGING AFTER 3 HOURS, WATER SEEMED VERY WARM, MUST BE NEAR STEAM LINE.

Sigature _____ Date 2-9-90 No. of Bottles 7

Arthur D Little

Arthur D Little

Soil Sample Log

Client EG+G Idaho
Project AMTC - WATERTOWN
Case No. 61453
Date FEBRUARY 1990

Sampling Method HAND Auger
Geologist(s) Scot Foster
Equipment Used STAINLESS STEEL BARREL-TYPE Augers (3")
LOCATION

Comments
- GRAB SAMPLES FROM Auger barrel FOR VOLATILE ORGANIC ANALYSIS
- SAMPLE COMPOSITES FOR SEMIVOLS, PCB's, METALS, CYANIDE

Sample Number	Auger Hole ID	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
01SOL01 01SOL01 DUP	01SOL01 01SOL01 DUPLICATE		ORGANIC RICH SILTY SAND (OL) WITH MINOR(?) PEBBLES (UP TO 1" DIAM), COLOR 5YR 2/2
02SOL01	02SOL01		METAL SHOP FLOOR DEBRIS INCLUDING METAL FILINGS, WOOD, OILY GRIME - 2 RADIOACTIVE CERAMIC BUTTONS FOUND
03SOL01	03SOL01		DARK BROWN (5YR 2/2) GRAVELLY SAND WITH ASH STONE FILL @ 1-4", BLACK-BROWN OILY GRAVEL/SAND @ 4-6" - NO ODOR, DEFINATE CONTAMINATION
04SOL01	04SOL01		THICK ORGANIC/GRASS MATT TO 1", 1-4" DARK BROWN (5YR 3/2) ORGANIC RICH LOAM, 4-6" OLIVE GRAY GRAVELLY SAND WITH 5% PEBBLES UP TO 1/2" DIAMETER
05SOL01	05SUB01		BROWN (5YR 3/2) ORGANIC RICH SANDY TOP SOIL TO 7" GRAY/BROWN/BLACK SANDY MATERIAL (CONTAMINATED ?) TO 12" (SAT), ABUNDANT PEBBLES (2") FROM 19-12"
05SOL01 DUPLICATE	05SUB01 DUPLICATE		" SAME AS ABOVE "
09SOL01	09SOL01		30-40% PEBBLE FILL MATERIAL PROXIMAL TO TRANSFORMER WITH OLIVE GRAY TO TAN SAND/GRAVEL MATRIX. HISTORY OF OIL LEAKS FROM TRANSFORMER
09SOL02	09SOL02		(30-40% PEBBLES WITH CONCRETE DEBRIS - FILL AROUND TRANSFORMER, GRAVEL/SAND MATRIX TAN TO RED BROWN (5YR 4/4 - 5YR 3/4), NO INDICATION OF CONTAMINATION
12SOL01	12SUB01		0-6" GRAVELLY ORGANIC RICH DARK BROWN (5YR 2/2) MATERIAL, 6-15" POORLY GRADED GRAVEL/SAND (GP) 5YR 4/4 TO 10YR 6/4 - POORLY GRADED GRAVEL TO 28"
13SOL01	13SOL01		TAN TO OLIVE BROWN (5Y 4/4) POORLY GRADED SAND/GRAVEL FROM (3-6" (GP), ORGANIC RICH TOP SOIL 0-3" - NO SIGN OF CONTAMINATION
14SUB01	14SUB01		UNIFORM POORLY GRADED GRAVELLY SAND (GP) FROM SURFACE TO 28" - DARK BROWN (5YR 2/2) - EXHIBITED METALLIC OBJECTS INCL. NAILS IN SOIL BORING
14SUB02	14SUB02		1-6" PEBBLY SANDY SOIL, 6-15" SANDY PEBBLY MATERIAL (GP) W/ 10-15% PEBBLES, 5YR 2/1 TO 5YR 3/2, 2" DIAM PIECE OF OXIDIZED LEAD FOUND IN TOP 6" OF PROFILE
15SOL01	15SOL01		ORGANIC RICH TOP SOIL (5YR 2/1) 0-3" W/ ABUND. PEBBLES 3-6" OLIVE TAN GRAVELLY SAND W/ CONCRETE & COAL (20%), ABUNDANT COAL & BRICK DEBRIS >6", NO ODORS
15SOL02	15SOL02		POORLY GRADED GRAVELLY SAND (GP) WITH BRICK FRAGMENTS AND 10-30% PEBBLES, DARK BROWN 5YR 2/2, W/ SURFACE ORGANIC MATT, LOCATED 25' FROM HIGHWAY

Arthur D Little

Soil Sample Log
Continuation Page

Client EG&G Idaho
Project AMTL - WARRENTON
Case No. 61453
Date FEBRUARY 1990

Sample Number	Auger Hole ID	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
17sub01	17 sub 01		DK. BROWN (5YR2.5/4) ORGANIC AND CLAY RICH TOP SOIL TO 6"; 6-12" GRADES FROM DARK BROWN TO OLIVE GRAY (5Y) POORLY GRADED SILTY SAND W/ MINOR UNCOMBUSTED COAL
17sub02	17 sub 02		1-6" POORLY SORTED GRAVELLY SAND WITH HIGH ORGANIC CONTENT, 6-12" GRAY-TAN POORLY GRADED SANDY GRAVEL WITH UNCOMBUSTED COAL, 12-15" POORLY-SORTED BLACK/BROWN GRAVEL
17sub03	17 sub 03		1-4" DARK BROWN ORGANIC RICH TOP SOIL; 4-15" UNIFORM OLIVE-BROWN (5Y 5/2) SILT (ML) WITH <2% PEBBLES, SAMPLE POINT ~ 50' FROM RIVERS EDGE.
17SoL01	17 SoL 01		ORGANIC RICH MATT 0-2" (5YR 2/2) WITH INORGANIC FINE SAND/SILT MIXTURE (ML) (5Y 4/4) WITH SLIGHT PLASTICITY FROM 2-6", ROOTS UP TO 3-4" DIAMETER
17SoL02	17 SoL 02		1-3" DARK BROWN SANDY, PEBBLY LOAM WITH HIGH ORGANIC CONTENT, 3-6" MEDIUM GR. WELL GRADED SAND (SW) WITH <2% PEBBLES (5 YR 3/4) - NO CONTAMINATION

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-15-90
Client EG+G/USAITHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description OPEN LID OF CISTERN, H_2O LEVEL @ TOP, DIPPED CONTAINER

Leak Detection / Monitoring Present (Describe) NONE

(Tank) / Sump Dimensions (LxWxH) 30' × 50' × 10' ~~MAX~~ Total Volume ≈15,000 FL.^{3} % Full 100 %

(Tank) / Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____

Type Of Construction STEEL AND CONCRETE

Content History CONTAINER REACTOR COOLING WATER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NONE / CHEMICAL/RADIATION PROTECTIVE GLOVES

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) CHEMICAL/RADIATION RESISTANT GLOVES. NO EQUIPMENT

Decontamination Procedures Used

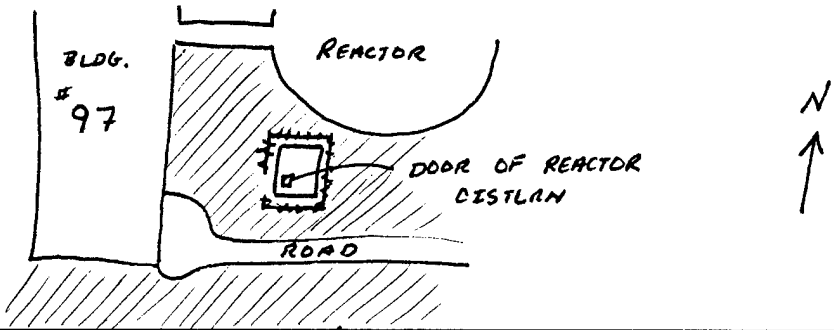
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☐ Other

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
AGAQUO1	DIPPING	1GALLON	NO	HNO_3 pH<2 + ICE	RAD SAMPLE	1515

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2-15-90 No. Of Bottles 1

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-15-90
Client AC+G/USATHAMA
Project AMIL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE RECTANGULAR STORM SEWER GRATE
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)
Tank / (Sump) Dimensions (LxWxH) SEE MAP Total Volume N.A. % Full SLIGHT FLOW
Tank / (Sump) Status: Active ✓ Inactive ____ Date Installed ____ Age ____
Type Of Construction BRICK AND CONCRETE
Content History STORM SEWER (SURFACE RUNOFF).

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NONE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y(N) 1 DIPPER W/ CHEMICAL RESISTANT GLOVES
Decontamination Procedures Used

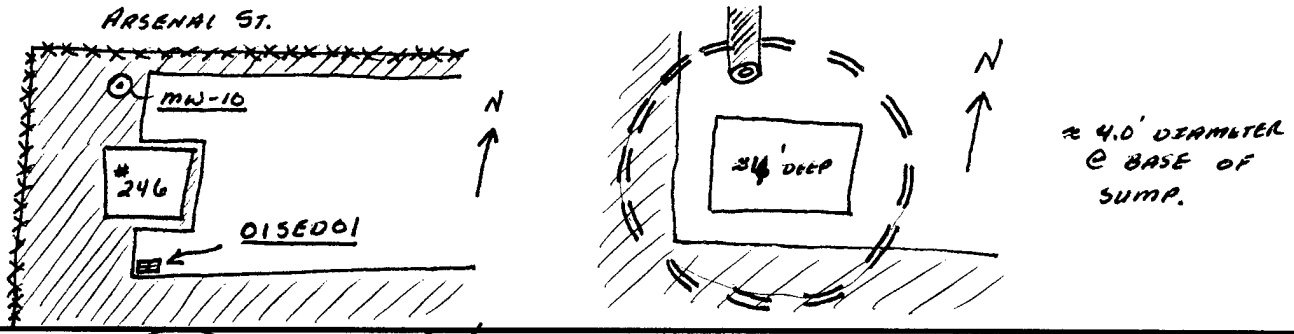
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other — DEDICATED DIP CUP

Solvent Used ____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
01SED01	DIP/SCRAPE	40 ml (x3)	No	Ice	TCL+30 Vol.	1555
" "	" "	1 l	No	Ice	TCL+30 Semi-PCB	1555
" "	" "	250 ml	No	Ice	Cyanide	1555
" "	" "	500 ml	No	Ice	Metals/Elem.	1555

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature ____ Date 2-15-90 No. Of Bottles 6

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-15-90
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE ROUNDED STORM SEWER GRATE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) SEE MAP Total Volume (N.A.) % Full STANDING WATER

Tank / Sump Status: Active ✓ Inactive _____ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) N.A.

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) USED A DIPPER/SCRAPPER BUCKET AND CHEM. RESISTANT GLOVES.

Decontamination Procedures Used

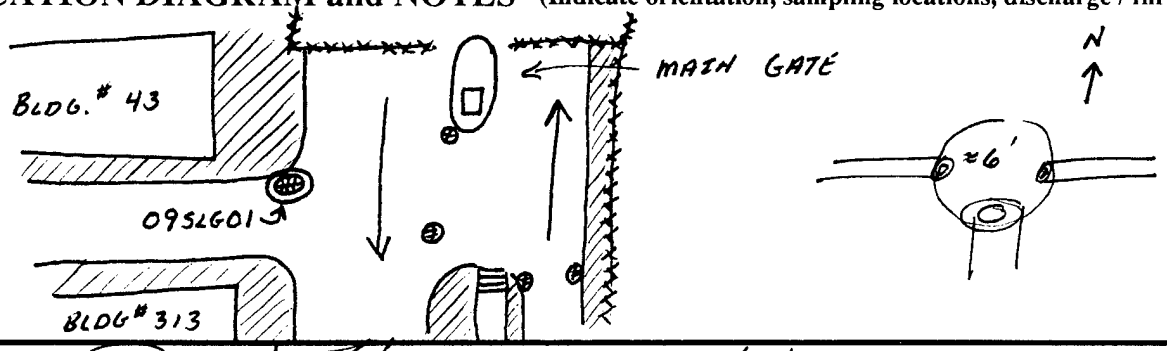
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other — DEDICATED SCRAPE BUCKET

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
095LG01	DIP/SCRAPE	40 ml (x3)	NO	ICE	TCL+30 VOL.	1635
" "	" "	1 l	NO	ICE	TCL+30 SEMI, + PCB	1635
" "	" "	250 ml	NO	ICE	CYANIDE	1635
" "	" "	500 ml	NO	ICE	METALS/TCL	1635

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/15/90 No. Of Bottles 6

Page 1 of 1

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-15-90
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE CIRCULAR GRATE (MANHOLE).
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)
Tank / (Sump) Dimensions (LxWxH) SEE MAP Total Volume N.A. % Full STANDING WATER
Tank / (Sump) Status: Active ✓ Inactive ____ Date Installed ____ Age ____
Type Of Construction BRICK AND CEMENT
Content History STORM SEWER AND SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) DIPPER/BUCKET AND CHEM. RESISTANT GLOVES
Decontamination Procedures Used

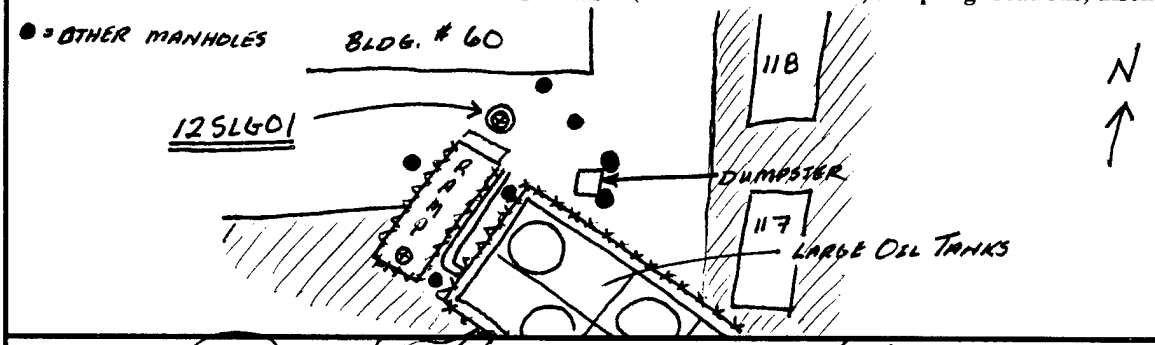
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other — DEDICATED BUCKET.

Solvent Used ____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
12SLG01	DIP/SCRAPE	40 ml (x3)	No	ICE	TCL+30 VOL	1615
" "	" "	1 l	No	ICE	TCL+30 SEMI, + PCB	1615
" "	" "	250 ml	No	ICE	CYANIDE	1615
" "	" "	500 ml	No	ICE	METALS/TCL	1615

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature ____ Date 2/15/90 No. Of Bottles 6

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

ENTER THROUGH STORM CELLAR DOORS ON S.W. CORNER,

Sampling Access Description FOLLOW ACCESS WAY TO 1ST LEFT, CROSS PIPES, SUMP JUST AS YOU CROSS PIPES.

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / (Sump) Dimensions (LxWxH) SEE MAP Total Volume JUST SLUDGE % Full 10 %

Tank / (Sump) Status: Active ✓ Inactive _____ Date Installed _____ Age _____

Type Of Construction CONCRETE

Content History BUILDING #39 SUMP.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) SCRAPPED SLUGE W/ GLOVED HAND AND GLASS BEAKER

Decontamination Procedures Used

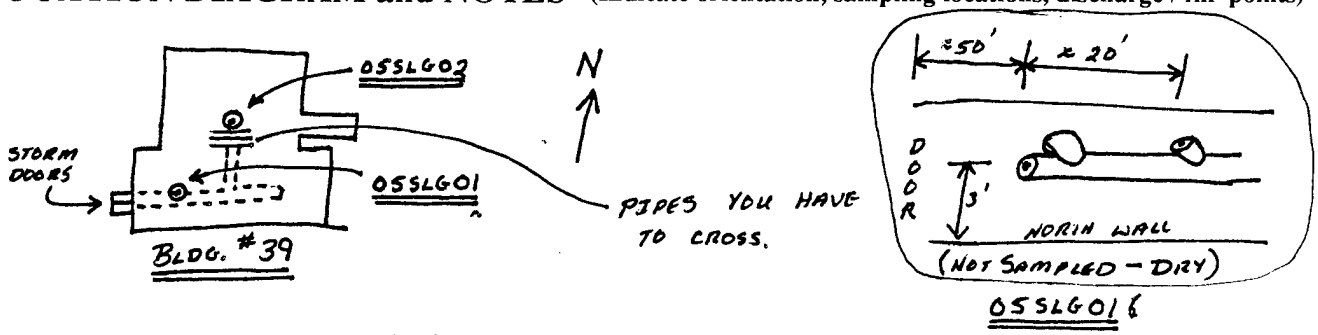
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other — 3x D.I. WATER RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
055LG02	GLASS BEAKER	40 ml (x3)	No	ICE	TCL+30 VOL.	1530
" "	" "	1 l	No	ICE	TCL+30 SEMI+ PCB	1530
" "	" "	250 ml	No	ICE	CYANIDE	1530
" "	" "	500 ml	No	ICE	METALS/TCL	1530

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/20/90 No. Of Bottles 6

Page 1 of 1

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90
Client LG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE ROUND/SOLID MANHOLE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / (Sump) Dimensions (LxWxH) 4' DIAM. 6' DEEP Total Volume N.A. % Full 4" STAND. H_2O

Tank / (Sump) Status: Active ✓ Inactive _____ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History SUMP EAST SIDE OF BUILDING #243.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) STAINLESS STEEL BAILER w/ DETERGENTED STRING + CHEM. RESIST. GLOVES

Decontamination Procedures Used

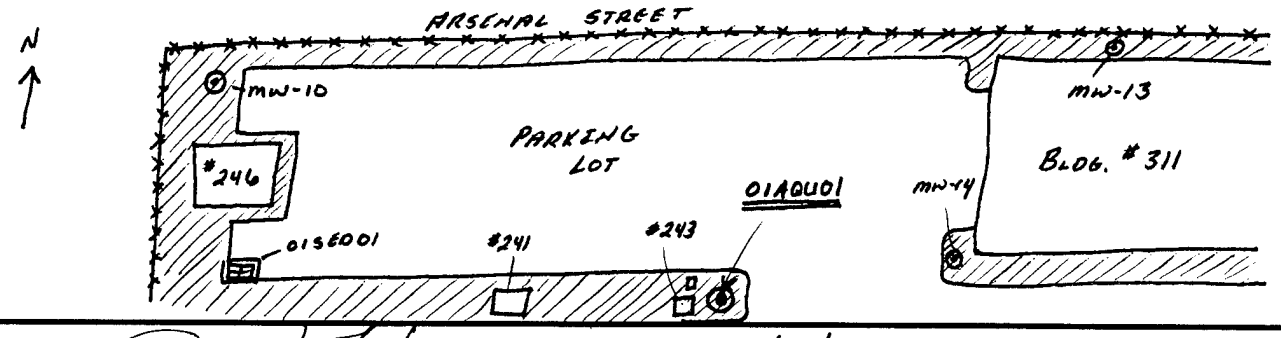
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. WATER RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
01AQU01	BAILER	40 ml (x3)	NO	ICE, HCl pH<2	TCL+30 VOL.	1330
" "	" "	1 GALLON	NO	ICE	TCL+30 SEMS.	1330
" "	" "	1 L	NO	ICE, NaOH pH>12	CYANIDE	1330
" "	" "	1 L	NO	ICE, NaOH pH>9 + Zn ACETATE	SULFIDE	1330
" "	" "	1 L	YES	ICE, HNO_3 pH<2	METALS/TCL	1330

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/20/90 No. Of Bottles 7

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90/2-22-90
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description LOWERED BAILER THROUGH VENT STACK

Leak Detection / Monitoring Present (Describe) TANKS MAINTAINED IN CONCRETE VAULT AS 2NDARY CONT.

(Tank) Sump Dimensions (LxWxH) 12' DIAM. 30' LONG Total Volume APPROX. 10,000 g EACH % Full < 5% EACH

(Tank) Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____

Type Of Construction STEEL TANKS IN CONCRETE VAULT AS SECONDARY CONTAINMENT

Content History CONTAINED FUEL OIL.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) 2-1" TEFLON BAILERS EACH (LABORATORY CLEANED PRE + POST SAMP)

Decontamination Procedures Used

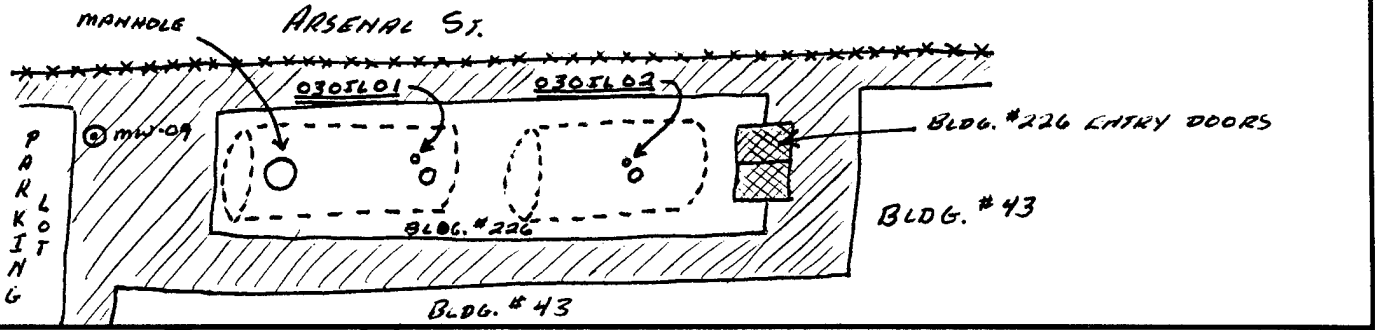
☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
☐ Solvent Rinse / Water Rinse
☐ Detergent Wash / Water Rinse
☒ Other: 3x D.I. RINSE BEFORE, HEXANE + DI RINSE AFTER

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
030IL02	1" BAILER	40 ml (x3)	No	ICE	TCL + 30 VOL.	1600 2/20/90
" "	" "	500 ml	No	ICE	TCL + 30 SEMI, PCB, CYANIDE, SULFIDE, PESTICIDE, METALS	1600 2/20/90
030IL01	1" BAILER	40 ml (x3)	No	ICE	SAME	1355 2/22/90
" "	" "	500 ml	No	ICE	SAME	1355 2/22/90

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/22/90 No. Of Bottles 4 + 4 = 8

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90
Client EG&G / USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description 2 - 2" HOLES DRILLED (PREVIOUSLY) THROUGH LAB FLOOR
Leak Detection / Monitoring Present (Describe) NONE
Tank / Sump Dimensions (LxWxH) UNKNOWN Total Volume _____ % Full ≈ 50 %
Tank / Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____
Type Of Construction UNKNOWN
Content History UNKNOWN (CESTERN UNDER BLDG. #313c

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) USED 1" DIAM. TEFLON BAILER, CHEM. RESIST. GLOVES, DI/DECONTED SAMPLING.
Decontamination Procedures Used

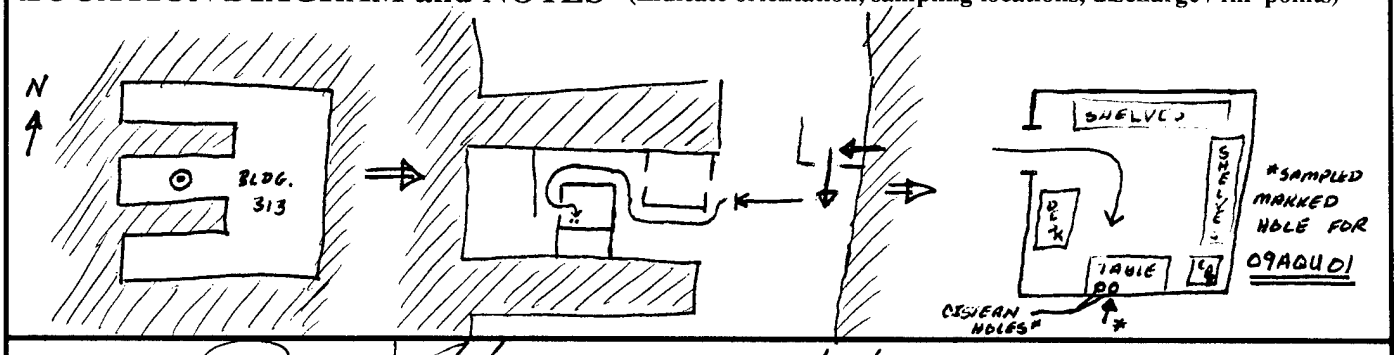
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3 x D.I. H_2O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
09AQU01	BAILER	40 ml (x3)	No	ICE, HCl pH<2	TCL + 30 Vol.	1415
" "	" "	1 GALLON	No	ICE,	TCL + 30 SEMI.	1415
" "	" "	1 l	No	ICE, NaOH pH>12	CYANIDE	1415
" "	" "	1 l	No	ICE, NaOH pH>9, ZN ACETATE	SULFIDE	1415
" "	" "	1 l	YES	ICE, HNO_3 pH<2	METALS/TCL	1415

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/20/90 No. Of Bottles 7

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90
Client EG+G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description 1" TEFLON BAILER THROUGH VENT STACK.

Leak Detection / Monitoring Present (Describe) NONE

Tank / Sump Dimensions (LxWxH) UNKNOWN Total Volume (@1,000) UNKNOWN % Full < 25%

Tank / Sump Status: Active ____ Inactive ✓ Date Installed ? Age ?

Type Of Construction STEEL (BASED ON VENT STACKS)

Content History (HEATING OIL?) TANK EAST SIDE OF BLDG. #39

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) 1" DIAM. BAILER W/ DEDICATED STRING, AND CHEM RESIST. GLOVES.

Decontamination Procedures Used

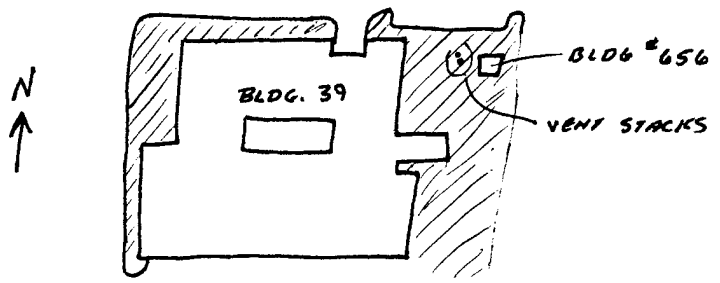
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. H_2O Rinse

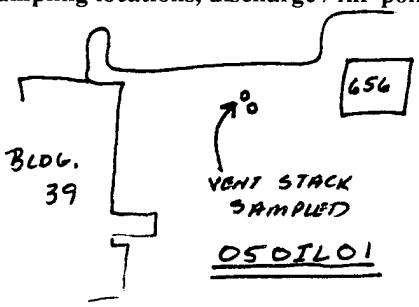
Solvent Used ____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
050IL01	BAILER	40 ml (x3)	No	Ice	TCL+30 VOL	1500
" "	" "	500 ml	No	Ice	TCL+30 SEMI, PCB/PEST, CYANIDE, SULFIDE, METALS	1500

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)





Signature ____ Date 2/20/90 No. Of Bottles 4

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22-90
Client EG+G / USATHAMA
Project ANIL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description THROUGH BLDG. 226 VAULT DOORS + DOWN LADDER. MANHOLE OPEN @ OTHER END.

Leak Detection / Monitoring Present (Describe) BLDG. 226 IS CONCRETE (2ND ARMY CONT.) AROUND 2 TANKS.

(Tank) / Sump Dimensions (LxWxH) 12' x 30' EACH Total Volume 2-10,000 GAL. % Full BOTH < 5%

(Tank) / Sump Status: Active _____ Inactive X Date Installed _____ Age _____

Type Of Construction VAULT = CONCRETE, TANKS = STEEL.

Content History VAULT HOUSES THE 2 TANKS, SLUDGE 035LG01 COLLECTED FROM VAULT FLOOR.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated (Y)/N) 3 PEOPLE: 1@ GROUND LEVEL, 1@ BASE OF LADDER W/ 5 MIN. ESCAPE PACK + HNO-PID. 1 SAMPLER IN SCBA (30 MIN) AND FLASHLIGHT.

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling	1350	21 ppm		
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) SCBA (30 MIN.), FLASH LIGHT, CHEM RESIST. GLOVE, GLASS BEAKER

Decontamination Procedures Used

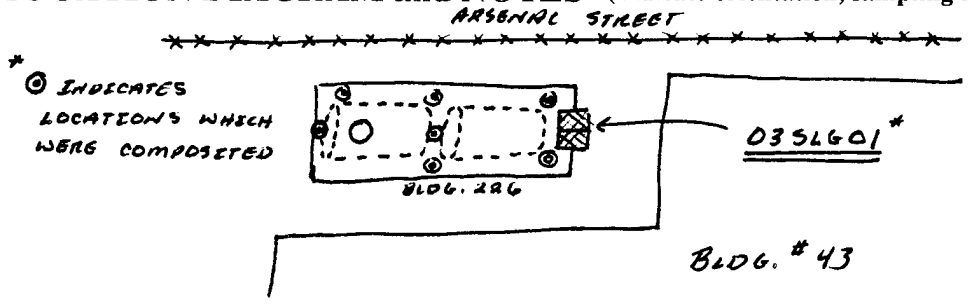
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. H_2O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
035LG01	GLASS BEAKER	40 ml (x2)	N/O	ICE	TCL + 30 VOL.	1355
	(SCRAPE FLOOR)	500 ml	N/O	ICE	TCL + 30 SEMI, PCB/PEST, CYANIDE, SULFIDE	1355

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/22/90 No. Of Bottles 3

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22-90
Client EG+G/USATHAMA
Project AMTL - WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description 2.0' DEEP (DRY) SUMP LOCATED IN BASEMENT OF BLDG. 36.

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE

Tank / (Sump) Dimensions (LxWxH) 1'x1'x2' Total Volume 2 CUBIC ft. % Full 0%

Tank / (Sump) Status: Active _____ Inactive X Date Installed _____ Age _____

Type Of Construction CONCRETE SUMP W/ SUMP PUMP INSTALLED.

Content History SUMP BLDG. 36.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) DEDICATED TEFLON BEAKER, WOODEN SCOOP, LAYTEX GLOVES

Decontamination Procedures Used

- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. H_2O RINSE

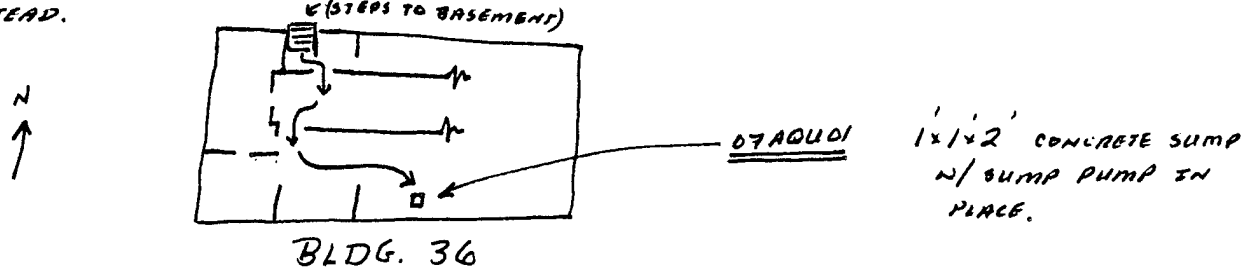
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
07AQU01	SCOOP	40ml (x3)	No	Ice	TCL + 30 Vol.	1445
" "	" "	1l	No	Ice	TCL + 30 Semi, PCB/Pest	1445
" "	" "	250ml	No	Ice	Cyanide	1445
" "	" "	500ml	No	Ice	Metals/TCL	1445

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

BECAUSE SUMP WAS DRY, EG+G REQUESTED THAT A SEDIMENT SAMPLE BE COLLECTED INSTEAD.



Signature _____ Date 2/22/90 No. Of Bottles 6

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE

Tank / (Sump) Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full V. LOW FLOW STANDING H2O

Tank / (Sump) Status: Active ✓ Inactive _____ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE USING STAINLESS STEEL DIPPER + CHEM. RESIS. GLOVES

Decontamination Procedures Used

- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. WATER RINSE

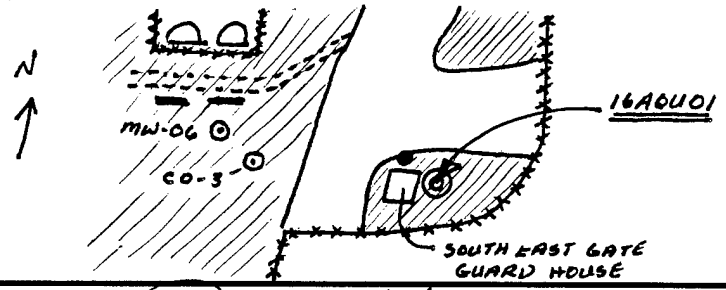
Solvent Used _____

SAMPLING

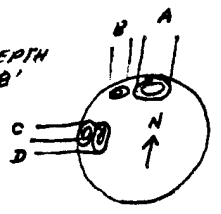
SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES OTHER	TIME
16AQU01	S.S. DIPPER	40 ml (x3)	No	Ice, HCl, pH<2	TCL + 30 VOL	2143 (2/22/90)
" "	" "	1 GALLON	No	Ice	TCL + 30 SEMI	1738
" "	" "	1 l	No	Ice, NaOH pH>12	CYANIDE	1738
" "	" "	1 l	No	Ice, NaOH pH>9, + 2N ACETATE	SULFIDE	1738
" "	" "	1 l	No	Ice, HNO3 pH<2	METALS/TCL	1738

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

24 HOUR COMPOSITE OF ALL SAMPLES EXCEPT VOA'S.



TOTAL DEPTH APPROX. 8'



(A) = 24" DIAM. NEAR BOTTOM
(B) = 12" DIAM. NEXT TO (A)
(C) = 5" DIAMETER, 3' FROM SURFACE
(D) = 8" DIAMETER 5' FROM SURFACE

(X) ONLY PIPE WITH FLOW, STANDING H_2O PRESENT BUT NOT SAMPLED.

Signature _____ Date 2/23/90 No. Of Bottles 7

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG+G/USATHAMA
Project AMTL - WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE

Tank / (Sump) Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full GOOD FLOW + STAGNANT H_2O

Tank / (Sump) Status: Active X Inactive _____ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE USING STAINLESS STEEL DIPPER + CHEM. RESIST. GLOVES.

Decontamination Procedures Used

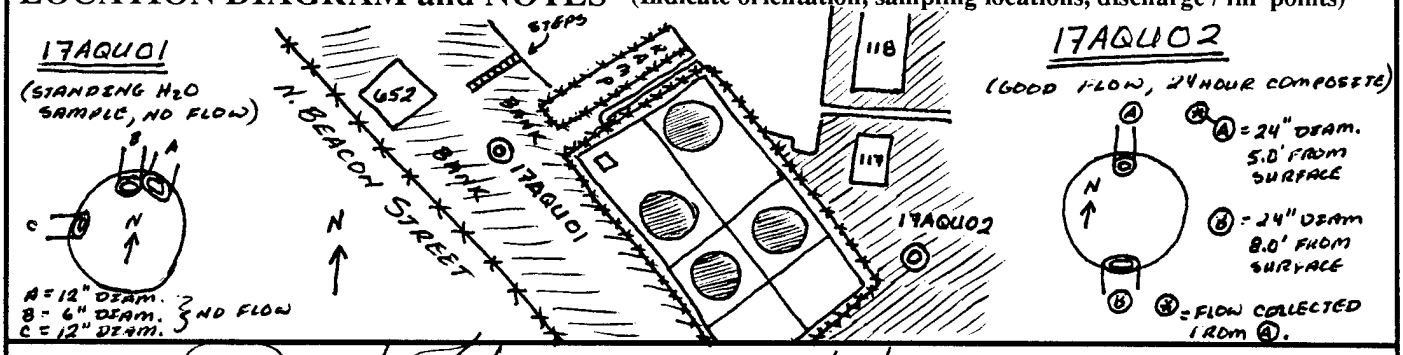
☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
☐ Solvent Rinse / Water Rinse
☐ Detergent Wash / Water Rinse
☒ Other: 3x D.I. H_2O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
17AQU02	S.S. DIPPER	40 ml (x3)	No	Ice, HCl, pH<2	TCL+30 Vol.	2215 (2/22/90)
" "	" "	1 GALLON	No	Ice	TCL+30 Semi.	1804 (2/23/90)
" "	" "	1 l	No	Ice, NaOH, pH>12	Cyanide	1804 (2/23/90)
" "	" "	1 l	No	Ice, NaOH, pH>9, + Zn Acetate	Sulfide	1804 (2/23/90)
" "	" "	1 l	No	Ice, HNO_3, pH<2	Metals/TCL	1804 (2/23/90)
17AQU01	SAME	SAME	SAME	SAME	SAME	1824 (2/23/90)

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/23/90 No. Of Bottles 7 + 7 = 14

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG&G/USATHAMA
Project AMTL-WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE
Tank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOW T STAND. H_2O
Tank / Sump Status: Active X Inactive _____ Date Installed _____ Age _____
Type Of Construction BRICK AND CONCRETE
Content History STORM SEWER (POSSIBLY SEPTIC/SANITARY SEWER)

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL DIPPER, CHEM. RESIST. GLOVES
Decontamination Procedures Used

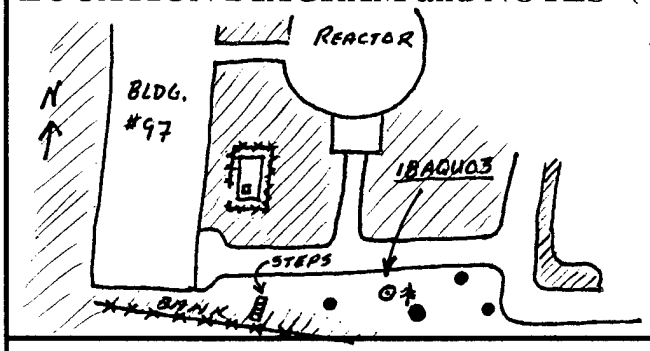
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. H_2O RINSE

Solvent Used _____

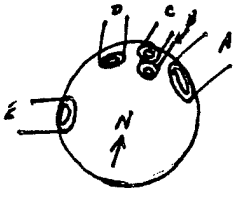
SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
1BAQU03	S.S. DIPPER	40 ml (x3)	No	Ice, HCl, pH<2	TCL+30 VOL	2230 (2/22/90)
" "	" "	1 GALLON	No	Ice	TCL+30 SEMI	1836 (2/23/90)
" "	" "	1 l	No	Ice, NaOH pH>12	CYANIDE	1836 (2/23/90)
" "	" "	1 l	No	Ice, NaOH pH>9, +Zn ACETATE	SULFIDE	1836 (2/23/90)
" "	" "	1 l	No	Ice, HNO_3 pH<2	METALS/TCL	1836 (2/23/90)

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



↑ = TREE
● = OTHER MANHOLES



Ⓐ = 12" DIAM. APPROX. 9.0' FROM SURFACE (F.S.)
Ⓓ = 6" DIAMETER APPROX. 6.0' F.S.
Ⓒ = 6" DIAM., APPROX. 4.0' (F.S.)
Ⓑ = 30" DIAMETER, APPROX. 10.0' F.S.
Ⓔ = 12" DIAMETER, APPROX. 3.0' F.S.

Ⓜ PIPES WITH FLOW WHICH WERE SAMPLED

Signature _____ Date _____ No. Of Bottles _____

Page ____ of ____

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG&G/USATHAMA
Project AMTL - WATERTOWN
Case No. 61453 50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE — 1BAQU02 / 1BAQU04

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE

Tank / (Sump) Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOW / LOW FLOW

Tank / (Sump) Status: Active X Inactive _____ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time	Reading	Time	Reading
Pre-Sampling				
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL APPAR., CHEM. RESIST. GLOVES

Decontamination Procedures Used

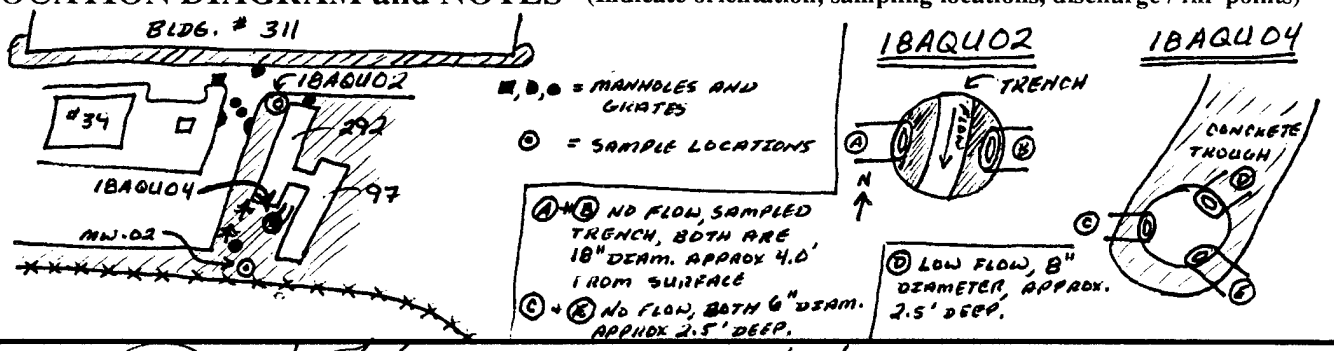
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. H_2O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	Analyses ~~OTHER~~	TIME
1BAQU02	S.S. DIPPER	40 ml (3x)	No	ICE, HCl pH<2	TCL + 30 VOL	2250 (2/22/90)
" "	" "	1 GALLON	No	ICE,	TCL + 30 SEMI	1435 (2/23/90)
" "	" "	1 L	No	ICE, NaOH pH>12	CYANIDE	1435 (2/23/90)
" "	" "	1 L	No	ICE, NaOH pH>9, ZN ACETATE	SULFIDE	1435 (2/23/90)
" "	" "	1 L	No	ICE, HNO_3 pH<2	METALS/TCL	1435 (2/23/90)
1BAQU04	SAME	SAME	SAME	SAME	SAME	VOA = 2307 (2/22/90) ACID = 1836 (2/23/90)

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/23/90 No. Of Bottles 7 + 7 = 14

Arthur D Little

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG&G/WATERTOWN
Project AMTI WATERTOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER GRATE
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE
Tank / (Sump) Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOW
Tank / (Sump) Status: Active X Inactive _____ Date Installed _____ Age _____
Type Of Construction BRICK AND CONCRETE
Content History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings		Time	Reading	Time	Reading
	Pre-Sampling				
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL DIPPER + CHEM. RESIST. GLOVES
Decontamination Procedures Used

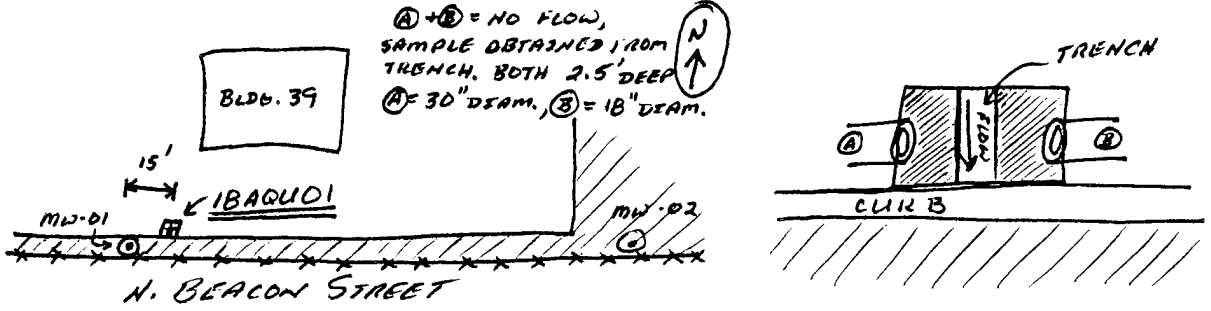
- ☐ Detergent Wash / Water Rinse / Solvent Rinse / Water Rinse
- ☐ Solvent Rinse / Water Rinse
- ☐ Detergent Wash / Water Rinse
- ☒ Other: 3x D.I. WATER RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES OTHER	TIME
IBAQUO1	S.S. DIPPER	40 ml (x3)	No	ICE, HCl, pH<2	TCL + 30 VOA	2320 (2/22/90)
" "	" "	1 GALLON	No	ICE	TCL + 30 SEMI	1902 (2/23/90)
" "	" "	1 l	No	ICE, NaOH, pH>12	CYANIDE	1902 (2/23/90)
" "	" "	1 l	No	ICE, NaOH, pH>9, 2N ACETATE	SULFIDE	1902 (2/23/90)
" "	" "	1 l	No	ICE, HNO3, pH<2	METALS/TCL	1902 (2/23/90)

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature _____ Date 2/23/90 No. Of Bottles 7

Arthur D Little

Memorandum

Date: February 9, 1990

To: C. Washburn

From: R. Lambe
Loc: 15F/214
Ext: 5498

Subject: AMTL Watertown Samples

I have been informed by my field crew that zinc acetate was added to the water samples for MW-01, MW-02, and MW-10 (collected on February 8) to be analyzed for metals by mistake. Please destroy these samples (metals fraction only). I am having new samples collected for metals today, February 9, for MW-01, MW-02, and MW-10. If you have any further questions, please call me at Ext. 5498.

Memorandum

Date: March 2, 1990

To: C. Washburn
cc: S. Spellenberg

From: K. Thrun
Loc: 15F/202
Ext: 2311

Subject: EG&G Idaho, AMTL Watertown

As discussed with you and Steve Spellenberg, metals analysis was inadvertently omitted from the chain-of-custody sheets for the following samples:

030IL01
03SLG01
03OIL02
050IL01 (if labeled 05OIL02, this sample should correctly be labeled 05OIL01)

Please add.

Memorandum

Date: February 16, 1990

To: C. Washburn

From: R. Lambe
Loc: 15F/214
Ext: 5498

Subject: AMTL Watertown Samples

I have been informed by my field crew that equipment blanks were collected today for the soil sampling activity, four days after the last complete day of soil sampling. The field crew duplicated soil sampling procedures at sample locations 01sol01 and 06sub01 and conducted normal decontamination procedures of all sampling equipment after each sample. Equipment blanks were collected following decontamination procedures and labelled 01sol01BL and 06sub01BL. No soil samples were actually collected during this procedure. If you have any further questions, please call me at extension 5498.

Memorandum

Date: April 25, 1990

To: Files

From: Robert Lambe, AMTL Project Manager

Subject: Chain-of-Custody Forms for AMTL Project

It has come to my attention that three chain-of-custody forms completed by Scot Foster of Arthur D. Little were signed in the "Sampler(s) (Signature)" space and not in the "Relinquished by: (Signature)" space as required. These forms are:

2/9/90	02S0L01, 06AQU01, 17S0L01, 17SUB01, 17SUB02	(two pages)
2/12/90	03S0L01, 06S0L01, 09S0L01, 09S0L02, 13S0L01, 15S0L01, 17S0102, 17SUB03	(two pages)
2/16/90	0S0L01TB, OS0L01BL, 06SUB01BL	(one page)

Each of the sample containers (coolers) holding these samples was personally delivered by Scot Foster on the evening of the collection day to the limited access, secure facilities of Arthur D. Little at Acorn Park in Cambridge. The samples were logged in by the laboratory as follows:

Samples Taken/Delivered	Samples Received by Laboratory
2/9/90	2/12/90
2/12/90	2/13/90
2/16/90	2/16/90

I, Scott Foster, do attest that the above statement is an accurate description of the situation described.

Signed Scot A. Foster — Date 4/25/90

Witnessed Robert N. Lambe, Project Manager — Date 4-25-90

Notarized Anne O. Joutman — Date 4/25/90

NOTARY PUBLIC
COMMONWEALTH OF MASSACHUSETTS
COUNTY OF MIDDLESEX

Arthur D Little

[redacted] PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Jeffrey N. Tart

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL + 30 Volatile Org.	TCL + 30 Semi-Volatile	Cyanide	Sulfide	Metals/TCL Metals	REMARKS
												See R. Lange memo NOTE: Metals Samples Discarded
MW-02	2/8/90	4:35 p.m.		✓	MW-02	3	X					ADL Trac #'s: 2846, 2847, 2879 ICE, pH<2 HCl
"	"	"		✓	"	1		X				" " : 2880 ICE
"	"	"		✓	" "	1			X			" " : 2850 ICE, NaOH pH>12
"	"	"		✓	" "	1				X		" " : 2851 Zn Acetate ICE, NaOH pH>9
"	"	"		✓	" "	1					X	" " : 2852 ICE, HNO_3 pH<2
MW-01	2/8/90	6:00 p.m.		✓	MW-01	3	X					" " : 2818, 2819, 2820 ICE, HCl, pH<2
"	"	"		✓	"	1		X				" " : 2821 ICE
"	"	"		✓	" "	1			X			" " : 2822 ICE, NaOH pH>12
"	"	"		✓	" "	1				X		" " : 2823 Zn Acetate ICE, NaOH pH>9
"	"	"		✓	" "	1					X	" " : 2824 ICE, HNO_3 pH<2
MW-10	2/8/90	7:00 p.m.		✓	MW-10	3	X					" " : 2825, 2826, 2827 ICE, HCl, pH<2
"	"	"		✓	"	1		X				" " : 2828 ICE
"	"	"		✓	" "	1			X			" " : 2829 ICE, NaOH pH>12
"	"	"		✓	" "	1				X		" " : 2830 Zn Acetate ICE, NaOH pH>9
"	"	"		✓	" "	1					X	" " : 2831 ICE, HNO_3 pH<2

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/9/90 1200	Wm. Sibb QA			
Relinquished by: (Signature) Jeffrey N. Tart	Date / Time 2/8/90 8:15 pm	Received for Laboratory by: (Signature)	Date / Time 2/9/90 1145	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

15969

ENVIRONMENTAL PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL+30 VOLATILES	TCL+30 SEMI VOLATILES	METALS/TCL METALS/CYANIDE/SULFIDE				REMARKS
TRIP BLANK	2/8/90	7:00 p.m.		✓	TRIP BLANK	1	X						See R. LAMBERTON. NOTE: METALS SAMPLES DISCARDED. ADL TAG #'s 2920 ECC
"	"	"		✓		1		X					2918 ECC
"	"	"		✓		1			X				2919 ECC
							* SAMPLE BUBBLE						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/9/90 1200				
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	2/8/90 8:25 pm		2/9/90 1145		

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

15971

ENVIRONME L PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Jerry N. Testa

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL + 30 SCMS VOLATILES	REMARKS
MW-01	2/8/90	6:00p.m.		✓	MW-01	1	X ✓	See R. LANGE MEMO NOTE: METALS SAMPLES DISCARDED ADL #'s: 2880
MW-02	2/8/90	9:35p.m.		✓	MW-02	1	X ✓	" " : 2821
MW-10	2/8/90	7:00p.m.		✓	MW-10	1	X ✓	" " : 2828

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/9/90 1200	Will Silf QA			
Relinquished by: (Signature) Jerry N. Testa	Date / Time 2/8/90 8:21pm	Received for Laboratory by: (Signature)	Date / Time 2/9/90 1145	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Cooler Numbe. 1 of 2

Arthur D. [illegible]tle, Inc.

CHAIN OF CUS[illegible]ODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: *(Signature)* [signature]

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+30 SemiVolatiles	Remarks	SAMPLE CONDITION UPON RECEIPT
CO-3	2-14-90	2:44 PM		✓	CO-3	Ice	✓	ADL TAG #'s : 0850	✓ O.K.
MW-06	2-14-90	2:54 PM		✓	MW-06	Ice	✓	: ~~0854~~ 0857	✓ O.K.
TRIP BLANK	2-14-90	3:50 PM		✓	TRIP BLANK	Ice	✓	: 0864	✓ O.K.

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Shipped to:
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)* L. W. Guilmette 2/15/90	
Relinquished by: *(Signature)* [signature]	Date/Time 2/14/90 4:00 PM	Received for Laboratory by: *(Signature)* [signature]	Date/Time 2/15/90 1010

Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
Telex 921436 Tel-Fax (617) 661-1622

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Numbe. 2 of 2

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) [signature]

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatiles	Cyanide	Sulfide	Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
CO-3	2-14-90	2:44 pm		✓	CO-3	Ice, HCl, pH<2	3 ✓				ADL TAG #'s: 0847, 0848, 0849	O.K.
" "	"	"		✓	" "	Ice, NaOH, pH>12		1 ✓			" " 0851	
" "	"	"		✓	" "	Ice, NaOH, pH>9 Zn Acetate			1 ✓		" " 0852	
" "	"	"		✓	" "	Ice, HNO_3, pH<2				1 ✓	" " 0853	
MW-06	2-14-90	2:50 pm		✓	MW-06	Ice, HCl, pH<2	3 ✓				" " 0854, 0855, 0856	
" "	"	"		✓	" "	Ice, NaOH, pH>12		1 ✓			" " 0858	
" "	"	"		✓	" "	Ice, NaOH, pH>9 Zn Acetate			1 ✓		" " 0859	
" "	"	"		✓	" "	Ice, HNO_3, pH<2				1 ✓	" " 0860	
							1					
TRIP BLANK	2-14-90	3:50 pm		✓	TRIP BLANK	Ice	3 ✓				" " 0861, 0862, 0863	
" "	"	"		✓	" "	Ice		X ✓	X ✓	X ✓	" " 0865	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	
		L. W. Gluckstein 2/15/90	
Relinquished by: (Signature) [signature]	Date / Time 2/14/90 4:00 pm	Received for Laboratory by: (Signature) [signature]	Date / Time 2/15/90 1015
			Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
Telex 921436 Tel-Fax (617) 661-1622

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Numb. _____ of _____

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page _____ of _____

PROJ. NO.: 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+30 Volatiles	TCL+30 Semi-Volatiles	Cyanide	Sulfide	Metals/TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
CO-2 - Field Blank	2/13/90	11:12		✓	CO-2 (DUP.) : FIELD BLANK	Ice, HCl pH<2	3					ADL Inc #'s : 0830, 0833, 0834	
" "	"	"		✓	" "	Ice,		4				: 0835	
" "	"	"		✓	" "	Ice, NaOH pH>12			1			: 0836	
" "	"	"		✓	" "	Ice, NaOH pH>9 (Zn Acetate)				1		: 0837	
" "	"	"		✓	" "	Ice, HNO_3 pH<2					1	: 0838	
MW-04 FIELD BLANK	2/13/90	4:55 PM		✓	MW-04 (DUP.) FIELD BLANK	Ice, HCl pH<2	3✓					: 0840, 0841, 0842	
" "	"	"		✓	" "	Ice		4				: 0843	
" "	"	"		✓	" "	Ice, NaOH pH>12			1			: 0844	
" "	"	"		✓	" "	Ice, NaOH pH>9 (Zn Acetate)				1		: 0845	
" "	"	"		✓	" "	Ice, HNO_3 pH<2					1	: 0846	
												one VOA labelled C-2, not CO-2	
												metals labelled C-02, not CO-2	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time: 2/14/90 955	Received by: (Signature): Wilma Smith 9/A	
Relinquished by: (Signature): Amy J. Tenta	Date/Time: 2/13/90 6:32 pm	Received for Laboratory by: (Signature): Cynthia Wilson	Date/Time: 2/14/90 955

Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
Telex 921436 Tel-Fax (617) 661-1622

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Numb 1 of _____

Arthur [redacted]ittle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMIL - WATERTOWN, MA.

SAMPLERS: (Signature) Jay J. Fortin

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	TCL + 30 Volatiles	TCL + 30 Semi Volatiles	Cyanide	Sulfide	Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
CO - 2	2-13-90	10:50		✓	CO-2 (DUPLICATE)	Ice, HCl pH<2	3					ADL TAG #'s: 0802, 0803, 0804	
" "	"	"		✓	" "	Ice,		1				: 0805	
" "	"	"		✓	" "	Ice, NaOH pH>12			1			: 0806	
" "	"	"		✓	" "	Ice, NaOH pH>9 Zn Acetate				1		: 0807	
" "	"	"		✓	" "	Ice, HNO_3 pH<2					1	: 0808	
MW - 04	2-13-90	2:42		✓	MW-04 (DUPLICATE)	Ice, HCl pH<2	3					: 0809, 0810, 0811	
" "		"		✓	" "	Ice		1				: 0812	
" "		"		✓	" "	Ice, NaOH pH>12			1			: 0813	
" "		"		✓	" "	Ice, NaOH pH>9 Zn Acetate				1		: 0814	
" "		"		✓	" "	Ice, HNO_3 pH<2					1	: 0815	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/14/90 | 945	Wm Smith DA	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Jay J. Fortin	2/13/90 | 6:30 pm		2/14/90 | 945

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
Telex 921436 Tel-Fax (617) 661-1622

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Numb. 2 of _____

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Jay W. Tate

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+30 Volatiles	TCL+30 SBMs Volatiles	Cyanides	Sulfide	Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
MW-05	2/13/90	5:35 PM		✓	MW-05	Ice, HCl pH<2	3					ADL Tag #'s: 0816, 0817, 0818	
" "	"	"		✓	" "	Ice		1				: 0819	
" "	"	"		✓	" "	Ice, NaOH pH>12			1			: 0820	
" "	"	"		✓	" "	Ice, NaOH (2N Acetate) pH>9				1		: 0821	
" "	"	"		✓	" "	Ice, HNO_3 pH<2					1	: 0822	
MW-11	2/13/90	5:35 PM		✓	MW-11	Ice, HCl pH<2	3					: 0823, 0824, 0825	
" "	"	"		✓	" "	Ice		1				: 0826	
" "	"	"		✓	" "	Ice, NaOH pH>12			1			: 0827	
" "	"	"		✓	" "	Ice, NaOH pH>9				1		: 0828	
" "	"	"		✓	" "	Ice, HNO_3 pH<2					1	: 0829	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time: 2/14/90 945	Received by: (Signature): Willi Sitt QA	
Relinquished by: (Signature): Jay W. Tate	Date/Time: 2/13/90 6:30 pm	Received for Laboratory by: (Signature): Cathy W. Wells	Date/Time: 2/14/90 945

Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
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*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Number 3 of 3

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Gary J. Foster

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatiles	TCL + 30 Semi Volatiles	Cyanide & Sulfide	Metals/TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
MW-12	2-12-90	4:00 PM		✓	MW-12		3				ADL FAC #'s: 0788, 0789, 0790	
" "	"	"		✓	" "			1			: 0791	
" "	"	"		✓	" "				1		: 0792	
" "	"	"		✓	" "					1	: 0793	
" "	"	"		✓	" "					1	: 0794	
CO-2	2-12-90	5:05 PM		✓	CO-2		3				: 0795, 0796, 0797	
" "	"	"		✓	" "			1			: 0798	
" "	"	"		✓	" "				1		: 0799	
" "	"	"		✓	" "					1	: 0800	
" "	"	"		✓	" "					1	: 0801	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/13/90 1330	Will Smith QA	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Gary J. Foster	2/12/90 PM 8:40		2/13/90 1330

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Cooler Numbe 2 of 3

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMIL - WATERTOWN, MA.

SAMPLERS: (Signature) Joseph J. Tate

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatiles	TCL + 30 Semi Volatiles	Cyanide	% Sulfides	Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
MW-03	2-12-90	6:23 pm		✓	MW-03	Ice, HCl, pH<2	3					ADL Inc #: 0774, 0775, 0776	
" "	"	"		✓	" "	Ice		1				0777	
" "	"	"		✓	" "	Ice, NaOH, pH>12 2N Acetate			1			0778	
" "	"	"		✓	" "	Ice, NaOH, pH>9				1		0779	
" "	"	"		✓	" "	Ice, HNO3, pH<2					1	0780	
MW-09	2-12-90	6:50 pm		✓	MW-09	Ice, HCl, pH<2	3					0781, 0782, 0783	
" "	"	"		✓	" "	Ice		1				0784	
" "	"	"		✓	" "	Ice, NaOH, pH>12 2N Acetate			1			0785	
" "	"	"		✓	" "	Ice, NaOH, pH>9				1		0786	
" "	"	"		✓	" "	Ice, HNO3, pH<2					1	0787	
					" "								

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	
	2/13/90 1330	[signature]	
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time / Carrier:
[signature]	2/12/90 8:30 pm	[signature]	2/13/90 1330

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Cooler Number 1 of 3

Arthur D[illegible]le, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+TC VOLATILES	TCL+TC SEMI VOLATILES	CYANIDE	SULFIDES	METALS/TCL METALS	Remarks	SAMPLE CONDITION UPON RECEIPT
MW-08	2-12-90	7:20 PM		✓	MW-08	Ice, HCl, pH<2	3✓					AIHL Tag #: 0760, 0761, 0762	
" "	"	"		✓	" "	Ice,		1✓				: 0763	
" "	"	"		✓	" "	Ice, NaOH, pH>12			1✓			: 0764	
" "	"	"		✓	" "	Ice, NaOH, pH<3 (Zn Acetate)				1✓		: 0765	
" "	"	"		✓	" "	Ice, HNO3, pH<2					1✓	: 0766	
MW-04	2-12-90	6:02 PM		✓	MW-04	Ice, HCl, pH<2	3✓					: 0767, 0768, 0769	
" "	"	"		✓	" "	Ice		1✓				: 0770	
" "	"	"		✓	" "	Ice, NaOH, pH>12			1✓			: 0771	
" "	"	"		✓	" "	Ice, NaOH, pH>9 (Zn Acetate)				1✓		: 0772	
" "	"	"		✓	" "	Ice, HNO3, pH<2					1✓	: 0773	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time: 2/13/90 1330	Received by: (Signature)	
Relinquished by: (Signature)	Date/Time: 2/12/90 8:15 pm	Received for Laboratory by: (Signature)	Date/Time: 2/13/90 1330

Carrier:

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Cooler Number: 2 of 2

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
G1453	NMTL - WATERTOWN, MA

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatiles	TCL + 30 Semi-Volatiles	CYANIDE	SULFIDE	METALS (TOTAL/DISS)			Remarks	SAMPLE CONDITION UPON RECEIPT
MW-14	02-09-90	12:50		✓	MW-14	ICE, HCl pH<2	3							ADL TAG #'s: 2930, 2933, 2935	
MW-14	02-09-90	"		✓	MW-14	ICE		1						" " : 2928	
MW-14	02-09-90	"		✓	MW-14	NaOH, ICE			1					" " : 2929	
MW-14	02-09-90	"		✓	MW-14	ICE NaOH, Zn Acetate				1				" " : 2930	
MW-14	02-09-90	"		✓	MW-14	HNO_3, ICE					1			" " : 2931	
MW-13	2-9-90	11:20		✓	MW-13	ICE, HCl pH<2	3							" " : 2925, 2926, 2927	
MW-13	2-9-90	"		✓	MW-13	ICE,		1						" " : 2924	
MW-13	2-9-90	"		✓	MW-13	ICE, NaOH pH>12			1					" " : 2923 Cyanide container compressed	
MW-13	2-9-90	"		✓	MW-13	ICE, Zn Acetate NaOH pH>9				1				" " : 2922	
MW-13	2-9-90	"		✓	MW-13	ICE, HNO_3 pH<2					1			" " : 2921	
MW-07	2-9-90	5:00		✓	MW-07	ICE, HCl pH<2	3							" " : 2956, 2957, 2958	
MW-07	2-9-90	"		✓	MW-07	ICE		1						" " : 2955	
MW-07	2-9-90	"		✓	MW-07	ICE, NaOH pH>12			1					" " : 2954	
MW-07	2-9-90	"		✓	MW-07	ICE, Zn Acetate NaOH pH>9				1				" " : 2953	
MW-07	2-9-90	"		✓	MW-07	ICE, HNO_3 pH<2					1			" " : 2915	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	
	2/12/90 1030	Wm. Silk QA	
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time / Carrier:
	2/9/90 5:30		2/12/90 10:30

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W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Number 1 of 2

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) [signature]

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: ICL 30 VOLATILES	ICL + 30 SEMIVOLATILES	CYANIDE	SULFIDE	METALS / ICL METALS	Remarks	SAMPLE CONDITION UPON RECEIPT
MW-01	2-7-90	11:35		✓	MW-01	ICE, HNO_3, pH<2					1✓	NOL TAG #'s : 2943	
MW-02	2-7-90	12:33		✓	MW-02	ICE, HNO_3, pH<2					1✓	" " : 2914	
MW-03	2-7-90	11:00		✓	MW-03	ICE, HNO_3, pH<2					1✓	" " : 2944	
~~OBA90001~~	~~2-7-90~~	~~10:45~~		~~✓~~	~~OBAMW01~~								
MW-07	2/8/90	5:00		✓	MW-07	ICE, HCl, pH<2	3✓					: 2956, 2957, 2958	
MW-07	2/8/90	5:00		✓	MW-07	ICE,		4				: 2955	
MW-07	2/8/90	5:00		✓	MW-07	ICE, NaOH, pH>12			1✓			: 2954	
MW-07	2/8/90	5:00		✓	MW-07	ICE, NaOH, pH>9				1✓		: 2953	
MW-07	2/8/90	5:00		✓	MW-07	ICE, HNO_3, pH<2					1✓	: 2915	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/12/90 1030	[signature]	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
[signature]	2/9/90 5:30	[signature]	2/12/90 1030

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Cooler Numbe 1 of 4

Arthur D[illegible]ittle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Jay J. Foster

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 SEMI VOLATILES	Remarks	SAMPLE CONDITION UPON RECEIPT
16AQU01	2-23-90	1738	✓		END OF TALCOTT AVE	Ice	1	ADL TAG #'S : 1998	
17AQU01	2-23-90	1824	✓		MANHOLE EAST OF BUILD 652	Ice	1	: 0927	
17AQU02	2-23-90	1804	✓		MANHOLE EAST OF BLDG 117	Ice	1	: 0934	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature) Jay J. Foster	2-23-90 1044	Received by: (Signature) Kevin Kuechler	
Relinquished by: (Signature) Kevin Kuechler	2-23-90 2005	Received for Laboratory by: (Signature) Cathy Wilson	Date/Time 2/24/90 0905

Carrier:

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Cooler Numb. 2 of 4

Arthur [redacted]ittle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 64453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) [signature]

SAMPLE/ STATION NUMBER	DATE	TIME	* COMP	* GRAB	STATION LOCATION	PRESERVATION	Analyses: TLC + 3D Semi Volatiles	Remarks	SAMPLE CONDITION UPON RECEIPT
1BAQU01	2-23-90	1902	✓		MANHOLE SOUTH OF BLDG 39	ICE	1 ✓ 2/3 full	ADL TAG #'s : 2970	
1BAQU02	2-23-90	1435	✓		MANHOLE SOUTH OF BLDG 100	ICE	1 ✓ 2/3 full	: 2977	
1BAQU03	2-23-90	1418	✓		CATCH BASIN N.E. OF BLDG 292 (CORNER)	ICE	1 ✓ 2/3 full	: 2984	
1BAQU04	2-23-90	636	✓		CATCH BASIN BETWEEN BUILDING 242 + BLDG 97	ICE	1 ✓ ~1L	: 2991	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature) [signature]	Date/Time 2-23-90 1044	Received by: (Signature) Kevin Kuechler	
Relinquished by: (Signature) Kevin Kuechler	Date/Time 2-23-90 1959	Received for Laboratory by: (Signature) Wilfa Sicbaldi	Date/Time 2/26/90 0910

Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

*Letter denotes sample matrix
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Cooler Number: 4 of 4

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

PROJ. NO.: 61453

PROJECT NAME: AMIL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
1840U04	2-23-90	636		✓	CATCH BASIN BETWEEN BLDG 292 + BLDG 97	ICE, HNO_3 pH<2	1	ADL TAG #: 2994	
								2/3 ~~full~~ empty	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/23/90 1044	Kevin Kuechler	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Kevin Kuechler	2/23/90 1950		2/26/90 0900

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Cooler Number 4 of 4

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

PROJ. NO.: 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL 30 Volatiles	Cyanide	Sulfide	Metals/TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
1BAQU01	2-22-90	2320		✓	MANHOLE SOUTH OF BLDG 39	Ice, HCl pH<2	3				ADL Tag #: 0938, 0939, 0940	
" "	2-23-90	1902	✓		" "	Ice, NaOH pH>12		1			: 2971	
" "	"	1902	✓		" "	Ice, NaOH, Zn Acetate pH>9			1		: 2972	
" "	"	1902	✓		" "	Ice, HNO3 pH<2				1	: 2973	
1BAQU02	2-22-90	2250		✓	MANHOLE SOUTH OF BLDG. 100	Ice, HCl pH<2	3				: 2974, 2975, 2976	
" "	2-23-90	1435	✓		" "	Ice, NaOH pH>12		1			: 2978	
" "	"	1435	✓		" "	Ice, NaOH, Zn Acetate pH>9			1		: 2979	
" "	"	1435	✓		" "	Ice, HNO3 pH<2				1	: 2980	
1BAQU03	2-22-90	2230		✓	CATCH BASIN N.E. CORNER OF BLDG 292	Ice, HCl pH<2	3				: 2981, 2982, 2983	
" "	2-23-90	1418	✓		" "	Ice, NaOH pH>12		1			: 2985	
" "	"	1418	✓		" "	Ice, NaOH, Zn Acetate pH>9			1		: 2986	
" "	"	1418	✓		" "	Ice, HNO3 pH<2				1	: 2987	
1BAQU04	2-22-90	2307		✓	CATCH BASIN BETWEEN BLDG 292 & BLDG 97	Ice, HCl pH<2	3				: 2988, 2989, 2990	
" "	2-23-90	636	✓		" "	Ice, NaOH pH>12		1			1/3 full : 2992	
" "	"	636	✓		" "	Ice, NaOH, Zn Acetate pH>9			1		2/3 full : 2993	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
			empty
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2-23-90 1044	Kevin Kuechler	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Kevin Kuechler	2-23-90 1950		2/26/90 0900

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Cooler Num. 3 of 4

Arthur .ittle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+TO Volatiles	Cyanide	Sulfide	Metals/TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
16AQU01	2-22-90	2143		✓	END OF TALCOTT AVE	Ice, HCl pH<2	3				AOL TAG #: 1995, 1996, 1997	
" "	2-23-90	1738	✓		" "	Ice, NaOH pH>12		1	→	1/3 full	: 1999	
" "	"	1738	✓		" "	Ice; NaOH, pH>9 2N Acetate			1	1/3 full	: 2000	
" "	"	1738	✓		" "	Ice, HNO_3 pH<2				1	: 0923	
17AQU01	2-23-90	1824		✓	MANHOLE EAST OF BLDG. 652	Ice, HCl pH<2	3 →	1/2" headspace			: 0924, 0925, 0926	
" "	2-23-90	1824	✓		" "	Ice, NaOH pH>12		1			: 0928	
" "	"	1824	✓		" "	Ice, NaOH, H>9 2N Acetate			1		: 0929	
" "	"	1824	✓		" "	Ice, HNO_3 pH<2				1	: 0930	
17AQU02	2-22-90	2215		✓	MANHOLE EAST OF BLDG. 117	Ice, HCl pH<2	3				: 0931, 0932, 0933	
" "	2-23-90	1804	✓		" "	Ice, NaOH pH>12		1			: 0935	
" "	"	1804	✓		" "	Ice, NaOH, H>9 2N Acetate			1		: 0936	
" "	"	1804	✓		" "	Ice, HNO_3 pH<2				1	: 0937	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2-23-90 1044	Kevin Kuechler	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Kevin Kuechler	2-23-90 1935		2/26/90 0900

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ENVIRONMENTAL PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO. 61453 | PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Scot A. Foster

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL+30 Volatile Organics	TCL+30 Semi Vol. Orgs.	PCBs	Cyanide	Metals/TCL Metals	REMARKS
	015OL01	2-8-90	11:25	✓	X	West Side of Building 243	3	X					ADL #'s: 2770, 2771, 2772 Cool <4°F
	"	"	11:25	✓		" " "	1		X	X			" " : 2773 "
	"	"	"	✓		" " "	1				X		" " : 2774 "
	"	"	"	✓		" " "	1					X	" " : 2775 "
SF	025OL01	2-8-90			✓	Steel Floor Building 311	3	X					" " : 2776, 2777, 2778 "
SF	"	"		✓		" " "	1		X	X			" " : 2779 "
SF	"	"		✓		" " "	1				X		" " : 2780 "
SF	"	"		✓		" " "	1					X	" " : 2781 "
92	065UB01	2-8-9	12:36		✓	South of Building 100	3	X					" " : 2782, 2783, 2784 "
	"	"	12:36	✓		" " "	1		X	X			" " : 2785 "
	"	"	"	✓		" " "	1				X		" " : 2786 "
	"	"	"	✓		" " "	1					X	" " : 2787 "
	125UB01	2-8-90	2:56		✓	Grass Area South of Bldg. 60	3	X					" " : 2788, 2789, 2790 "
	"	"	"	✓		" " "	1		X	X			" " : 2791 "
	"	"	"	✓		" " "	1				X		" " : 2792 "

NOTE: PCB SAMPLES Memo R LAMBE

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Scot A. Foster					
Relinquished by: (Signature)	Date / Time 2/9/90 1130	Received by: (Signature) Wm. Sicht QA	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time 2/9/90 1130	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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ENVIRONMENTAL PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO. 61453 | PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Scott A. Foster

	STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL + 30 VOL. ORG.	TCL + 30 SEMI VOL ORG.	PCB's	CYANIDE	METALS / TCL METALS	REMARKS
	125UB01	2-8-90	2:56	✓		GRASS AREA SOUTH OF BLDG. 60	1					X	ADL #'s: 2793 COOL <4°C
	145UB01	2-8-90	3:38		✓	SOUTHEAST CORNER, UNIT 14	3	X					" " : 2794, 2795, 2796 "
	"	"	"	✓		" " "	1		X	X			" " : 2797 "
	"	"	"	✓		" " "	1			X			" " : 2798 "
	"	"	"	✓		" " "	1				X		" " : 2799 "
	145UB02	2-8-90	2:00		✓	NORTHEAST CORNER, UNIT 14	3	X					" " : 2800, 2801, 2802 "
	"	"	"	✓		" " "	1		X	X			" " : 2803 "
	"	"	"	✓		" " "	1			X			" " : 2804 "
	"	"	"	✓		" " "	1				X		" " : 2805 "
SF	~~155UL01~~	~~2-8-90~~			✓	SOUTHEAST CORNER, UNIT 15	3	X					" " : ~~2806, 2807, 2808~~ "
SF	~~"~~	~~"~~		✓		" " "	1		X	X			" " : ~~2809~~ "
SF	~~"~~	~~"~~		✓		" " "	1			X			" " : ~~2810~~ "
SF	~~"~~	~~"~~		✓		" " "	1				X		" " : ~~2811~~ "
	155UL02	2-8-90	4:30		✓	NORTHWEST CORNER, UNIT 15	3	X					" " : 2812, 2813, 2814 "
	"	"	4:30	✓			1		X	X			" " : 2815 "

NOTE! No PCB Memo Samples Relinquished

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Scott A. Foster					
Relinquished by: (Signature)	Date / Time 2/9/90 1145	Received by: (Signature) Willi Sibt QA	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

17173

ENVIRONMENTAL PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO. 61453 | PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) Scott A. Foster

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	CYANIDE	METALS / TCL METALS	TCL + Semi Vol Org.	PCB's	TCL + Vol Org.	REMARKS
												NOTE: NO PCB SAMPLES Memo RLAMBE
15SOL02	2-8-90		✓		NORTHWEST CORNER, UNIT 15	1	✓					ADL #'s: 2816 COOL < 4°C
"	"		✓		" " "	1		✓				" " : 2817 "
01SOL01 DUPLICATE	2-8-90			✓	W. SIDE OF Bldg 243	3				✓		ADL #'s 2860, 2861, 2862
"	"		✓			1			✓	✓		# 2863
"	"		✓			1	✓					2864
"	"		✓			1		✓				2865
06SOL01 DUPLICATE	2-8-90			✓	S. OF Bldg 100	3	✓			✓		ADL #'s 2866, 2867, 2868
"	"		✓			1			✓	✓		# 2869
"	"		✓			1	✓					2870
"	"		✓			1		✓				2871
					erroneous							
					WHS 2/9/90							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Scott A. Foster					
Relinquished by: (Signature)	Date / Time 2/9/90 445	Received by: (Signature) Willi Sicht QA	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature) Cynthia Will	Date / Time 2/9/90 1145	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

A 7 1 7 1

Cooler Number: _____ of _____

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 2

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN

SAMPLERS: *(Signature)* Scott A. Foss

SAMPLE/ STATION NUMBER	DATE	TIME	* COMP	* GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 VOLATILE ORGANICS	TCL + 30 SEMI-VOL. ORGANICS	CYANIDE	TCL METALS / METALS	PCB's	Remarks	SAMPLE CONDITION UPON RECEIPT
17Sub01	2/9/90	2:10		✓	PARK - South of N. BEACON ST.	ICE	5*						
"	"	"	✓				1						
"	"	"	✓					1					
"	"	"	✓						1				
"	"	"	✓							1			
17Sub02	2/9/90	3:00		✓	PARK - South of N. BEACON ST.	ICE	3						
"	"	"	✓					1					
"	"	"	✓						1				
"	"	"	✓							1			
"	"	"	✓								1		

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Shipped to:
Relinquished by: *(Signature)*	Date/Time: 2/12/90 | 1030	Received by: *(Signature)* Will Sibl QA	
Relinquished by: *(Signature)*	Date/Time	Received for Laboratory by: *(Signature)*	Date/Time: 2/12/90 | 1030 — Carrier:

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Telex 921436 Tel-Fax (617) 661-1622

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

ENVIRONMENTAL PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO. 61453 | PROJECT NAME: AMTL - WATERTOWN

SAMPLERS: (Signature) Scott A. Foster

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOLATILE ORGANICS	SEMI-VOLATILE ORGANICS	PCB'S	METALS	CYANIDE	REMARKS
03SoL01	2/12/90	9:12	✓		NW SIDE BLDG 43	1			X			ADL TAG # SP ~~2882~~ 2881
06SoL01	2/12/90	11:39	✓		NE SIDE BLDG 100	1			X			SP ~~2883~~ 2882
09SoL01	2/12/90	9:53	✓		W. SIDE BLDG 313	1			X			SP ~~2884~~ 2883
09SoL02	2/12/90	10:30	✓		E. SIDE BLDG 313	1			X			2884
13SoL01	2/12/90	12:25	✓		S. SIDE BLDG 131	1			X			2885
15SoL01	2/12/90	1:50		✓	NW OF PROPELLANT STORAGE AREA		3					ADL TAG # 2893, 2894, 2895
"	"	"	✓		"			1				2898
"	"	"	✓		"				1			2896
"	"	"	✓		"					1		2897
"	"	"	✓		"						1	2899
17SoL02	2/12/90	3:05		✓	PARK - SOUTH SIDE OF NORTH BEACON STREET		3					ADL TAG # 2960, 2961, 2916
"	"	"	✓		"			1				2962
"	"	"	✓		"				1			2964
"	"	"	✓		"					1		2917
"	"	"	✓		"						1	2963

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/13/90 1640	[illegible] QA			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
			2/13/90 1640	PAGE 1 OF 2	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

15967

Cooler Number: _____ of _____

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page _____ of 2

PROJ. NO.: 61453

PROJECT NAME: AMTL - WATERTOWN, MA

SAMPLERS: (Signature) Scott A. Foss

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 VOLATILES	TCL + 30 SEMI VOLATILES	CYANIDE	METALS	PCB's	SULFIDES	Remarks	SAMPLE CONDITION UPON RECEIPT
02-SOL-01	2/9/90	9:42		✓	INSIDE Bldg 311	ICE	3							
"	"	"	✓		"	"		1					ONE SAMPLE BOTTLE FOR BOTH PCB's AND SEMI VOLATILES	
"	"	"	✓		"	"			1					
"	"	"	✓		"	"				1			EXPECT HIGH METAL CONTENT INCL. Fe, Cr, Ni - SAMPLE SCREENING NEEDED	
06AQU01	2/9/90	10:45		✓	Bldg 100 - UNDERGR. TANK	HCL	3						— STAT —	
"	"	"		✓		ICE		1						
"	"	"		✓		NAOH, ICE			1					
"	"	"		✓		HNO_3, ICE				1				
"	"	"		✓		NAOH, ZN ACETATE					1			
17SOL01	2/9/90	3:45		✓	PARK, South of N. BEACON ST	ICE	3							
			✓					1						
			✓						1					
			✓							1				
			✓								1			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time: 02/12/90 1030	Received by: (Signature): Willi Sikl QA	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature): [signature]	Date/Time: 2/12/90 1030

Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

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*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

ENVIRONMENT PROTECTION AGENCY
Region I Waste Management Division

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
61453	AMTL - WATERTOWN

SAMPLERS: *(Signature)* Scot A. Foster

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOLATILE ORGANICS	SEMI-VOLATILE ORGANICS	PCB'S	METALS	CYANIDE	REMARKS
175b03	2/12/90	4:00		✓	PARK - South of North Benon Street	3	1/3					ADL TAG # 0753, 0754, 0755
"	"	"	✓		"	1		1				0756
"	"	"	✓		"	1			1			0758
"	"	"	✓		"	1				1		0759
"	"	"	✓		"	1					1	0757

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
	2/13/90 1640	Will Smith USA			
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	
		Crystal Wall	2/13/90 1640	PAGE 2 OF 2	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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Cooler Numbe. 1 of 1

Arthur D 'tle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453-00

PROJECT NAME: ATTL Waterbury, MA

SAMPLERS: (Signature) Christopher B. Mead

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+30 Volatiles	TCL+30 Semivolatiles	PCB's	Cyanide	Metals/TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
01SED01	2/15/90			✓	Storm Sewers, Sta Const	Ice	3					Sediments	
"	2/15/90			✓	"	"		X	X			"	
"	2/15/90			✓	"	"				1		"	
"	2/15/90			✓	"	"					1	"	
09SLG01	2/15/90			✓	Storm Sewer Cont Mh 4	Ice	3					"	
"	2/15/90			✓	and Tailcott	"		X	X			"	
"	2/15/90			✓	"	"				1		"	
"	2/15/90			✓	"	"					1	"	
12SLG01	2/15/90			✓	Storm Drain Unit 12	Ice	3					"	
"	2/15/90			✓	"	"		X	X			"	
"	2/15/90			✓	"	"				1		"	
"	2/15/90			✓	"	"					1	"	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/16/90 1050	William Smith QA	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
Christopher B. Mead	2/15/90 17:00		2/16/90 1050

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*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Num _____ of _____

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD PCB's

Page ____ of 1

PROJ. NO.	PROJECT NAME
64513	AMTL - WATERTOWN

SAMPLERS: *(Signature)* Scot A. Foote

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatile Organics	TCL + 30 Semivolatile Organics	PCBs	Metals	Cyanide	Remarks	SAMPLE CONDITION UPON RECEIPT
~~05OL01 TB~~ 01SOL01 TB													
~~05OL01 TB~~	2/16/90	1:30			~~05OL01 TB~~	ICE *	3					ADL TAG # 1991, 1992, 1993	
~~05OL01 BL~~	2/16/90	12:00		✓	~~05OL01 BL~~	"	3					ADL TAG # 1979, 1980, 1981	
01SOL01 BL			✓		01SOL01 BL	"		1				1982	
~~TMS 2/16/90~~ # one was omitted			✓			"			1			1983	
			✓			"				1		1984	
06SUB01 BL	2/16/90	1:00		✓	06SUB01 BL	"	3					ADL TAG # 1986, 1987, 1988	
			✓			"		1				1985	
			✓			"			1			1989	
			✓			"				1		1990	
												* all trip blanks have small bubbles	
												* no chain of custody seal on cooler	

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Shipped to:
Relinquished by: *(Signature)*	Date/Time 2/16/90 1615	Received by: *(Signature)* Willi Sulit QA	
Relinquished by: *(Signature)*	Date/Time	Received for Laboratory by: *(Signature)*	Date/Time 2/16/90 1615

Carrier:

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*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Number 1 of 2

Arthur D [illegible]tle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME
61453	AMTL - Watertown, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL+30 Volatiles	TCL+30 Semi Volatiles	PCB	Cyanide	Metals/TCL Metals	Sulfide	Pesticide	Remarks	SAMPLE CONDITION UPON RECEIPT
055LG02	2/20/90	1530		✓	SEWER CLEANOUT E. SIDE BLDG. 39	ICE	3							ADL TAG#: 0887, 0888, 0889	
" "	"	"		✓	" "	ICE		X	X					: 0890	
" "	"	"		✓	" "	ICE			1					: 0891	
" "	"	"		✓	" "	ICE					1			: 0892	
01AQU01	2/20/90	1330		✓	SUMP, EAST SIDE BLDG. 243	ICE, HCl, pH<2	3							ADL TAG#: 0866, 0867, 0868 (BROKE)	
" "	"	"		✓	" "	ICE,		1						: 0869	
" "	"	"		✓	" "	ICE, NaOH, pH>12				1				: 0870	
" "	"	"		✓	" "	ICE, NaOH, pH>9 2% Acetate						1		: 0871	
" "	"	"		✓	" "	ICE, HNO3, pH<2					1			: 0872	
830EL02	2/20/90	1530		✓	EAST TANK BULGE 2246	ICE	3							ADL TAG#: 0899, 0900, 0901	
" "	"	"		✓	" "	ICE		X	X	X		X	X	: 0902	
														1 VOA 01AQU01 is missing	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
	2/21/90 925	Will Sill QA	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time / Carrier:
	2/20/90 1550		2/21/90 925

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

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*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Numbe 2 of 2

Arthur D[illegible]ttle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature)

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	TCL + 30 Volatiles	TCL + 30 Semi-Volatiles	Cyanide	Sulfide	Metals / TCL Metals	PCB / Pest.	Remarks	SAMPLE CONDITION UPON RECEIPT
09AQU01	2/20/90	1415		✓	CESTERN UNDER BLDG. 313C	Ice, HCl, pH<2	3L						ADL TAG #s : 0880, 0881, 0882	
" "	"	"		✓	" "	Ice		1L					: ~~0883~~ ~~0884~~ ~~0885~~ 0921	
" "	"	"		✓	" "	Ice, NaOH, pH>12			1L				: ~~0886~~ ~~0887~~ 0884	
" "	"	"		✓	" "	Ice, NaOH, pH>9				1L			: 0885	
" "	"	"		✓	" "	Ice, HNO_3, *pH<2					1		: 0886	
09OIL02	2/20/90	1500		✓	TANK EAST SIDE BUILD #39	Ice	3L						: 0903, 0904, 0905	
" "	"	"		✓	" "	Ice		X	X	X		X	: 0906	
TRIP BLANK	2/20/90	1550		✓	Ice		3L						ADL TAG # : 0907, 0908, 0909	
													all trip blank VOA's have sm. bubbles	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	
	2/21/90 920	With Sill QA	
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time / Carrier:
	1645 2/20/90	Cynthia Wallace	2/21/90 920

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W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Cooler Number. 1 of 1

Arthur D[illegible]tle, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO. 61453

PROJECT NAME: AMTL - WATERTOWN, MA.

SAMPLERS: (Signature) [signature]

SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION	Analyses: TCL + 30 Volatiles	TCL + 30 Semi Volatiles	PEST / PCB	Cyanaide	Sulfide	PCB	Metals / TCL Metals	Remarks	SAMPLE CONDITION UPON RECEIPT
030IL01	2-22-90	1335		✓	WEST TANK BLDG 224	Ice	✓2							ADL Tag #: 0910, 0911	
030IL01	2-22-90	1335		✓	" "	Ice		✓X	✓X	✓X	✓X			: 0912	
035LG01	2-22-90	1355		✓	FLOOR, BLDG 226	Ice	✓2							ADL Tag #: 0913, 0914	
035LG01	2-22-90	1355		✓	" "	Ice		✓X	✓X	✓X	✓X			: 0915	
07AQU01	2-22-90	1445		✓	SUMP, BLDG. 36	Ice	✓3							ADL Tag #: 0916, 0917, 0918	
07AQU01	2-22-90	1445		✓	" "	Ice		✓X			✓X			: 0919	DRY, SO WE
07AQU01	2-22-90	1445		✓	" "	Ice			✓1					: 0920	
07AQU01	2-22-90	1445		✓	" "	Ice						✓1		: 0922	COLLECTED SED SAMPLES.
														→ 2 1/4 L containers	
														035LG01 bottles says VOAs, not semi VOAs	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Shipped to:
Relinquished by: (Signature)	Date/Time 2/22/90 1640	Received by: (Signature) [signature]	
Relinquished by: (Signature) [signature]	Date/Time 2-22-90 1530	Received for Laboratory by: (Signature) [signature]	Date/Time 2/22/90 1640 — Carrier:

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*Letter denotes sample matrix
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